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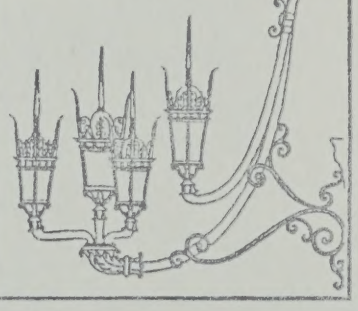

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Worcester Commuter Rail Extension Project

EOEA No. 9154

DRAFT Environmental Impact Report

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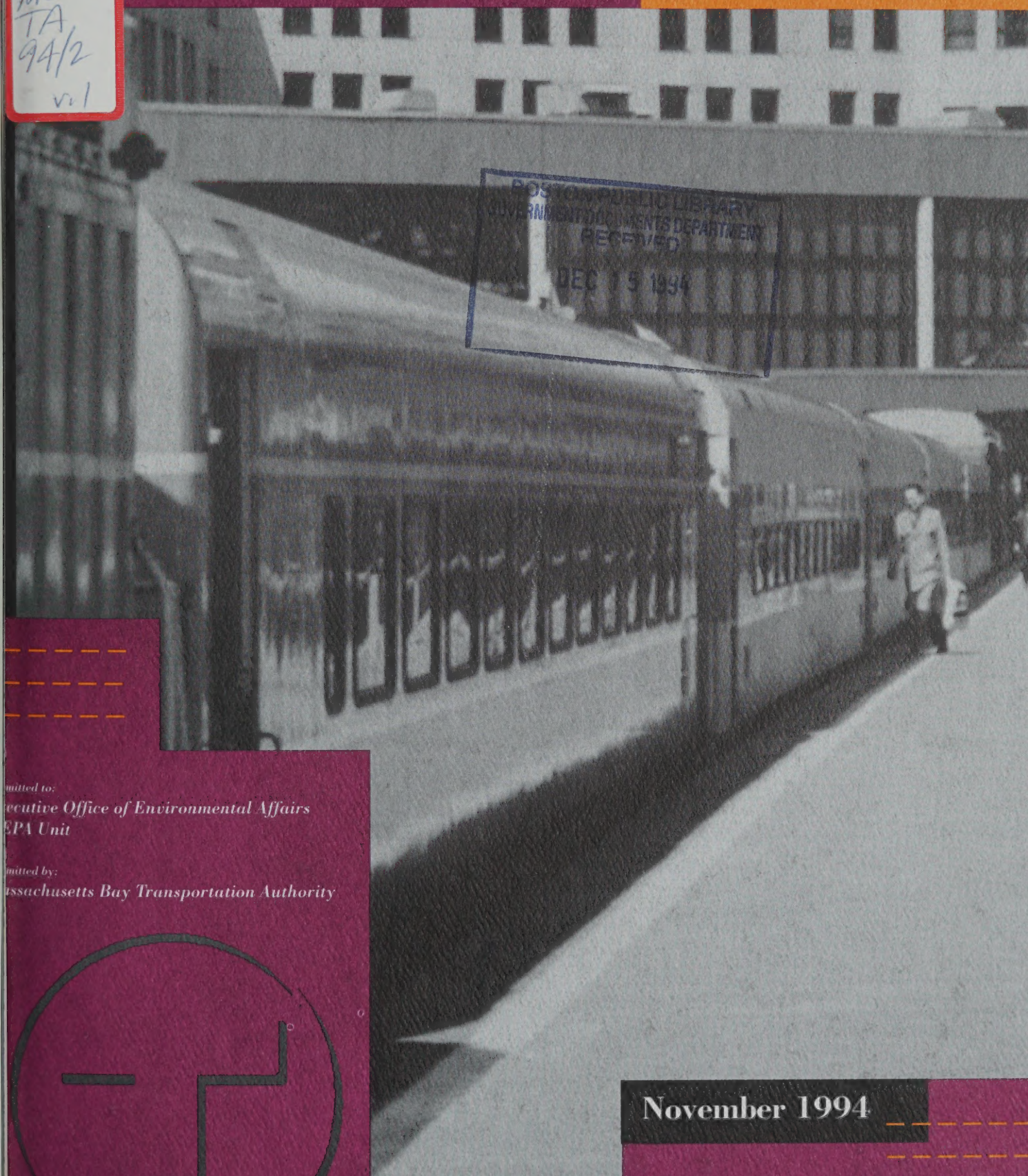

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November 1994

Massachusetts Bay Transportation Authority

William F. Weld, Governor | Argeo Paul Cellucci, Lieutenant Governor | James J. Kerasiotes, Secretary and MBTA Chairman | John J. Haley, Jr., General Manager

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December 1994

Dear Reviewer:

Attached for your review and approval is the Draft Environmental Impact Report (DEIR) for the Worcester Commuter Rail Extension Project (Executive Office of Environmental Affairs (EOEA) #9154).

The Massachusetts Bay Transportation Authority (MBTA) plans to develop an extension of the Framingham line to Worcester with five intermediate station sites (Ashland, Southborough, Westborough, Grafton and Millbury). This DEIR examines the environmental impacts of each station alternative and of service along the corridor. As part of the special procedure established in the Certificate on the Environmental Notification Form, a Citizens Advisory Committee (CAC) was established to review this document prior to its submittal. The CAC's comments are contained within this document.

As laid out in the Certificate, this DEIR is scheduled to be put out for 60 days of public comment after being noticed in the Environmental Monitor. I realize, however, that a better portion of this comment period will overlap with the upcoming holiday season. I think it may be unfair for us to ask and expect readers to review this extensive document over the holidays and then give meaningful comments. For that reason, we have requested that the Secretary of EOEA take comments for 90 days to accommodate the readers.

There are two volumes of technical appendices that compliment this DEIR. Copies of these technical appendices are available for review at the Public Library in each affected community (i.e. Worcester, Millbury, Grafton, Westborough, Southborough, Ashland, Hopkington, Framingham and Boston). Additionally, a set of technical appendices and the DEIR will be available for review at the Transportation Library in the State Transportation Building (10 Park Plaza, Boston).

If you need additional copies of this DEIR, or have any questions regarding this project, please contact Jane Sherman of the MBTA Environmental Unit at 617-722-5312.

Sincerely,

Andrew D. Brennan
Manager of Environmental Affairs

ADB/gk

Attachment

Massachusetts Bay Transportation Authority, Ten Park Plaza, Boston, MA 02116-3974

Worcester Commuter Rail Extension Project

DRAFT ENVIRONMENTAL IMPACT REPORT

EOEA No. 9154

Commonwealth of Massachusetts

William F. Weld
Governor

Paul Cellucci
Lieutenant Governor

James J. Kerasiotes
Secretary and MBTA Chairman

John J. Haley, Jr.
MBTA General Manager

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TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

DEIR CIRCULATION LIST CIRC-1

SECTION 1.0 PROJECT OVERVIEW 1-1
1.1 Proposed Project 1-1
1.2 History of Public Transportation in Study Corridor 1-5
1.3 Existing Transportation Services in the Study Corridor 1-13
1.4 Proposed Transportation Improvements By Others 1-30
1.5 History of Project 1-33
1.6 Permits and Approvals 1-37

SECTION 2.0 NEEDS ANALYSIS 2-1
2.1 Altered Public Policy on Transportation 2-1
2.2 Definition of Service Area 2-2
2.3 Demographics of the Service Area 2-4
2.4 Purpose and Need 2-6

SECTION 3.0 PROJECT ELEMENTS 3-1
3.1 Railroad Right-of-Way 3-1
3.2 Stations 3-12
3.3 Layover Facility 3-37
3.4 Commuter Rail Train Schedules 3-39
3.5 Implementation Schedule 3-47
3.6 Costs and Revenues 3-47
3.7 MBTA Mitigation Policy 3-50

SECTION 4.0 ALTERNATIVES ANALYSIS 4-1
4.1 Feasibility Report Analyses 4-1
4.2 Commuter Bus Service Alternative 4-12
4.3 No Build 4-15
4.4 Conclusion–Preferred Alternative 4-16

SECTION 5.0 RIDERSHIP PROJECTIONS, REGIONAL TRAFFIC, AND AIR QUALITY IMPACTS 5-1
5.1 Ridership Projection Methodology 5-1
5.2 Definition of Service Area 5-3
5.3 Ridership Projections 5-4
5.4 Regional Transportation Impacts 5-6
5.5 Regional Air Quality Impacts 5-9

SECTION 6.0 SOCIO-ECONOMIC IMPACTS 6-1
6.1 Induced Development and Land Use 6-1
6.2 Property Values 6-3
6.3 Local Revenues 6-5
6.4 Assessments 6-6

SECTION 7.0 ENVIRONMENTAL IMPACTS—RAILROAD RIGHT-OF-WAY 7-1
7.1 Local Traffic 7-10
7.2 Air Quality 7-11
7.3 Noise and Vibration 7-12
7.4 Right-of-Way Drainage 7-28
7.5 Wetlands 7-51
7.6 Rare Species and Ecologically Significant Natural Communities 7-59
7.7 Fencing 7-61
7.8 Cultural Resources 7-65
7.9 Visual Impacts 7-81
7.10 Hazardous Materials 7-81
7.11 Pedestrian Safety 7-82
7.12 Construction 7-82
7.13 Proposed Mitigation and Mitigation Options 7-83

SECTION 8.0 ALTERNATIVE LAYOVER FACILITY SITES 8-1
8.1 Layover Site Selection Criteria 8-1
8.2 Site Identification and Evaluation 8-2
8.3 Layover Site Screening and Recommendation 8-6

SECTION 9.0 ENVIRONMENTAL IMPACTS—LAYOVER FACILITY 9-1
9.1 Local Traffic 9-3
9.2 Air Quality 9-3
9.3 Noise and Vibration 9-6
9.4 Site Drainage 9-10
9.5 Hazardous Materials 9-11

9.6 Construction 9-14
9.7 Proposed Mitigation and Mitigation Options 9-14

SECTION 10.0 ENVIRONMENTAL IMPACTS - WORCESTER INTERIM STATION 10-1
10.1 Local Traffic 10-1
10.2 Proposed Mitigation and Mitigation Options 10-10

SECTION 11.0 ALTERNATIVE COMMUTER RAIL STATION SITES/STATION DESIGNS 11-1
11.1 Site Identification and Evaluation Criteria 11-1
11.2 Candidate Sites - Worcester 11-5
11.3 Candidate Sites - Millbury 11-8
11.4 Candidate Sites - Grafton 11-9
11.5 Candidate Sites - Westborough 11-10
11.6 Candidate Sites - Southborough 11-12
11.7 Candidate Sites - Ashland 11-13
11.8 Alternative Station Designs 11-16

SECTION 12.0 ENVIRONMENTAL IMPACTS— MILLBURY STATION 12-1

MILLBURY STATION - Route 122

12.1 Local Traffic 12-5
12.2 Air Quality 12-28
12.3 Noise and Vibration 12-29
12.4 Site Drainage 12-33
12.5 Wetlands and Wildlife 12-35
12.6 Historic Properties/Sites 12-35
12.7 Archaeological Resources 12-36
12.8 Visual Impacts 12-36
12.9 Hazardous Materials 12-37
12.10 Pedestrian Safety 12-38
12.11 Construction 12-39
12.12 Proposed Mitigation and Mitigation Options 12-40

MILLBURY STATION - Route 20

12.13 Local Traffic 12-41
12.14 Air Quality 12-65
12.15 Noise and Vibration 12-66
12.16 Site Drainage 12-66
12.17 Wetlands and Wildlife 12-67
12.18 Historic Properties/Sites 12-68
12.19 Archaeological Resources 12-68
12.20 Visual Impacts 12-69
12.21 Hazardous Materials 12-69
12.22 Pedestrian Safety 12-70
12.23 Construction 12-71
12.24 Proposed Mitigation and Mitigation Options 12-72

SECTION 13.0 ENVIRONMENTAL IMPACTS—GRAFTON STATION 13-1
13.1 Local Traffic 13-3
13.2 Air Quality 13-25
13.3 Noise and Vibration 13-26
13.4 Site Drainage 13-29
13.5 Wetlands and Wildlife 13-33
13.6 Historic Properties/Sites 13-34
13.7 Archaeological Resources 13-34
13.8 Visual Impacts 13-34
13.9 Hazardous Materials 13-35
13.10 Pedestrian Safety 13-38
13.11 Construction 13-38
13.12 Proposed Mitigation and Mitigation Options 13-39

SECTION 14.0 ENVIRONMENTAL IMPACTS—WESTBOROUGH STATION 14-1
14.1 Local Traffic 14-3
14.2 Air Quality 14-26
14.3 Noise and Vibration 14-27
14.4 Site Drainage 14-29
14.5 Wetlands and Wildlife 14-31
14.6 Historic Properties/Sites 14-33

14.7 Archaeological Resources 14-33
14.8 Visual Impacts 14-34
14.9 Hazardous Materials 14-35
14.10 Hocomonco Pond Superfund Site 14-37
14.11 Pedestrian Safety 14-39
14.12 Construction 14-39
14.13 Proposed Mitigation and Mitigation Options 14-40

SECTION 15.0 ENVIRONMENTAL IMPACTS—SOUTHBOROUGH STATION 15-1
15.1 Local Traffic 15-3
15.2 Air Quality 15-27
15.3 Noise and Vibration 15-28
15.4 Site Drainage 15-31
15.5 Wetlands and Wildlife 15-32
15.6 Historic Properties/Sites 15-33
15.7 Archaeological Resources 15-34
15.8 Visual Impacts 15-34
15.9 Hazardous Materials 15-36
15.10 Pedestrian Safety 15-38
15.11 Construction 15-39
15.12 Proposed Mitigation and Mitigation Options 15-40

SECTION 16.0 ENVIRONMENTAL IMPACTS—ASHLAND STATION 16-1

ASHLAND STATION - EAST

16.1 Local Traffic 16-4
16.2 Air Quality 16-33
16.3 Noise and Vibration 16-34
16.4 Site Drainage 16-37
16.5 Wetlands and Wildlife 16-39
16.6 Historic Properties and Sites 16-40
16.7 Archaeological Resources 16-40
16.8 Visual Impacts 16-41
16.9 Hazardous Materials 16-42
16.10 Pedestrian Safety 16-48
16.11 Construction 16-48
16.12 Proposed Mitigation and Mitigation Options 16-49

ASHLAND STATION - WEST

16.13 Local Traffic 16-51
16.14 Air Quality 16-52
16.15 Noise and Vibration 16-52
16.16 Site Drainage 16-55
16.17 Wetlands and Wildlife 16-56
16.18 Historic Properties and Sites 16-57
16.19 Archaeological Resources 16-57
16.20 Visual Impacts 16-57
16.21 Hazardous Materials 16-58
16.22 Pedestrian Safety 16-58
16.23 Construction 16-58
16.24 Proposed Mitigation and Mitigation Options 16-58

SECTION 17.0 REGIONAL STATION ANALYSIS 17-1
17.1 Introduction 17-1
17.2 Impact of Regional Station on Ridership 17-2
17.3 Regional Station Site Alternatives 17-4

SECTION 18.0 ENVIRONMENTAL IMPACTS— FRAMINGHAM STATION 18-1
18.1 Status of Framingham Station Project 18-1
18.2 Gate Closings 18-2
18.3 Proposed Mitigation and Mitigation Options 18-3

SECTION 19.0 ENVIRONMENTAL IMPACTS— BOSTON SOUTH STATION/ BACK BAY STATION 19-1
19.1 Pedestrian Traffic 19-1
19.2 Approach and Platform Track Capacity at South Station 19-5

APPENDICES (Included in DEIR)

ENF SUBMISSION
MEPA CERTIFICATE, OCTOBER 8, 1992
MEPA CERTIFICATE, OCTOBER 22, 1992
NOTICE OF PROJECT CHANGE, NOVEMBER 29, 1993
MEPA CERTIFICATE (INTERIM SERVICE), JANUARY 14, 1994
CAC COMMENTS

APPENDIX - VOLUME I (Separate Document)

SECTION 1.0 TRAFFIC ANALYSES

APPENDIX - VOLUME II (Separate Document)

SECTION 2.0 CTPS RIDERSHIP/PARKING DEMAND

SECTION 3.0 NOISE AND VIBRATION

SECTION 4.0 ARCHAEOLOGICAL SURVEY

SECTION 5.0 DRAINAGE, WETLANDS AND WILDLIFE

SECTION 6.0 AIR QUALITY

SECTION 7.0 CITIZENS ADVISORY COMMITTEE - MINUTES OF MEETINGS

SECTION 8.0 ENF COMMENTS

LIST OF TABLES

Table ES-1 Brief Summary of Mitigation Proposed by Area of Impact Analyzed in DEIR ES-21
Table 1.3-1 Existing Study Area Vanpools 1-24
Table 1.3-2 Massachusetts Turnpike Carpool Pass Program 1-25
Table 1.3-3 Framingham Line Ridership Trends and Parking 1-27
Table 1.3-4 MBTA Commuter Rail Systemwide Ridership Trends 1-27
Table 2.3-1 Population and Labor Force Trends Worcester Commuter Rail Extension Service Area 2-7
Table 2.3-2 Employment Trends Worcester Commuter Rail Extension Service Area 2-8
Table 2.3-3 Journey-to-Work Trends Worcester Commuter Rail Extension Service Area 2-9
Table 2.3-4 Work Trips to Boston and Cambridge Trends Worcester Commuter Rail Extension Service Area 2-10
Table 2.3-5 Work Trips to Worcester 2-11
Table 2.3-6 Work Trips by Mode of Travel - 1990 Worcester Commuter Rail Extension Service Area 2-12
Table 3.1-1 Proposed Railroad Vertical Clearance Improvements 3-3
Table 3.4-1 Proposed Zone Assignments and Fare Structure Worcester Commuter Rail Extension 3-39
Table 3.4-2 Interim Service Worcester Commuter Rail Eastbound MBTA Trains Worcester to South Station 3-41
Table 3.4-3 Interim Service Worcester Commuter Rail Westbound MBTA Trains South Station to Worcester 3-42
Table 3.4-4 Basic Service Worcester Commuter Rail Eastbound MBTA Trains Worcester to South Station 3-43
Table 3.4-5 Basic Service Worcester Commuter Rail Westbound MBTA Trains South Station to Worcester 3-44
Table 3.4-6 Expanded Service Worcester Commuter Rail

	Eastbound MBTA Trains Worcester to South Station	3-45
Table 3.4-7	Expanded Service Worcester Commuter Rail Westbound MBTA Trains South Station to Worcester	3-46
Table 3.6-1	Construction Cost Estimate	3-49
Table 3.6-2	Annualized Capital Cost for Preferred Alternative	3-50
Table 3.6-3	Net Annual Cost of Worcester Extension Project	3-50
Table 4.1-1	Worcester Commuter Rail Extension Study Area	4-5
Table 4.1-2	Total Rail and Bus Boardings - Year 2010	4-7
Table 4.1-3	Summary of Capital Costs (1990 Feasibility Study Estimates)	4-8
Table 4.1-4	Rail Operating and Maintenance Costs (1990 Feasibility Study Estimates)	4-8
Table 4.1-5	Bus Operating and Maintenance Costs (1990 Feasibility Study Estimates)	4-10
Table 4.1-6	Total Operating and Maintenance Costs (1990 Feasibility Study Estimates)	4-10
Table 4.1-7	Net Annual Cost of Rail Alternative (Feasibility Study Estimates)	4-12
Table 4.1-8	Recalculated Net Annual Cost of Rail Alternatives	4-12
Table 4.2-1	Annualized Capital Cost for Commuter Bus Alternative	4-14
Table 4.2-2	Net Annual Cost of Commuter Bus Alternative	4-14
Table 5.3-1	Ridership Projections - Worcester and Intermediate Stations - Alternate 4	5-6
Table 5.3-2	Ridership Projections, 1996, Stations at Worcester and One Intermediate Station, Unconstrained Parking - Alternate 3	5-6
Table 5.3-3	Reduction in Traffic Volumes During the A.M. Peak Period	5-8
Table 5.5-1	Comparison of Daily Regional Emissions (Kilograms/day)	5-11
Table 5.5-2	Peak Hour Massachusetts Turnpike Extension Emissions	5-12
Table 5.5-3	Net Reduction in Daily Emissions	5-12
Table 5.5-4	Pollutant Emissions (kg/day) Comparison of Buses versus Trains	5-14
Table 5.5-5	Net Reduction in Regional Emissions	5-15
Table 7.3-1	Train Noise Impact Assessment at Measurement Sites	7-16
Table 7.3-2	Corridor-Wide Train Noise Impact Inventory	7-18
Table 7.3-3	Summary of Potential Train Noise Mitigation - Expanded Service	7-20
Table 7.3-4	Corridor-Wide Train Vibration Impact Inventory for Basic and Expanded Commuter Rail Service	7-22

Table 7.3-5 Summary of Potential Train Vibration Mitigation 7-25
Table 7.4-1 Culvert Crossings Along Mainline 7-29
Table 7.5-1 Total Project Wetland Impacts 7-57
Table 7.7-1 Railroad Corridor Sideline Fencing 7-64
Table 7.8-1 Historic Properties/Sites 7-66
Table 10.1-1 1992 Unsignalized Intersection Level of Service 10-5
Table 10.1-2 Town of Origin - Year 1996 Projected Ridership Worcester Station 10-6
Table 10.1-3 1996 Unsignalized Intersection Level of Service 10-8
Table 10.1-4 2001 Unsignalized Intersection Level of Service 10-10
Table 12.1-1 1992 Existing Signalized Intersection Level of Service 12-8
Table 12.1-2 1992 Existing Unsignalized Intersection Level of Service 12-9
Table 12.1-3 1992 Existing Road Segment Level of Service 12-11
Table 12.1-4 Town of Origin Millbury Station (Route 122) Projected Ridership - Year 1996 12-12
Table 12.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours 12-15
Table 12.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours 12-15
Table 12.1-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours 12-16
Table 12.1-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours 12-17
Table 12.1-9 1996 Road Segment Level of Service - A.M. Peak Hours 12-18
Table 12.1-10 1996 Road Segment Level of Service - P.M. Peak Hours 12-18
Table 12.1-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only) 12-20
Table 12.1-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only) 12-21
Table 12.1-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only) 12-21
Table 12.1-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only) 12-22
Table 12.1-15 1996 Road Segment Level of Service - A.M. Peak Hours (Millbury Station Only) 12-22
Table 12.1-16 1996 Road Segment Level of Service - P.M. Peak Hours 12-23
Table 12.1-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours 12-24
Table 12.1-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours 12-24
Table 12.1-19 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours 12-25

Table 12.1-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours 12-26
Table 12.1-21 2001 Road Segment Level of Service - A.M. Peak Hours 12-26
Table 12.1-22 2001 Road Segment Level of Service - P.M. Peak Hours 12-27
Table 12.2-1 1996 CO Concentrations - Route 122/Exit 11 Intersection, Millbury 12-29
Table 12.4-1 Peak Runoff Rates Millbury Station Route 122 Alternative 12-34
Table 12.13-1 1992 Existing Signalized Intersection Level of Service . . . 12-44
Table 12.13-2 1992 Existing Unsignalized Intersection Level of Service 12-45
Table 12.13-3 1992 Existing Road Segment Level of Service 12-45
Table 12.13-4 Town of Origin Millbury Station (Route 20) Projected Ridership - Year 1996 12-47
Table 12.13-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours 12-51
Table 12.13-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours 12-51
Table 12.13-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours 12-52
Table 12.13-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours 12-53
Table 12.13-9 1996 Road Segment Level of Service - A.M. Peak Hours 12-53
Table 12.13-10 1996 Road Segment Level of Service - P.M. Peak Hours 12-54
Table 12.13-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only) 12-56
Table 12.13-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only) 12-57
Table 12.13-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only) 12-58
Table 12.13-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only) 12-59
Table 12.13-15 1996 Road Segment Level of Service - A.M. Peak Hours (Millbury Station Only) 12-59
Table 12.13-16 1996 Road Segment Level of Service - P.M. Peak Hours (Millbury Station Only) 12-60
Table 12.13-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours 12-61
Table 12.13-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours 12-62
Table 12.13-19 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours 12-63

Table 12.13-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours 12-64
Table 12.13-21 2001 Road Segment Level of Service - A.M. Peak Hours 12-64
Table 12.13-22 2001 Road Segment Level of Service - P.M. Peak Hours 12-65
Table 12.16-1 Peak Runoff Rates Millbury Station Route 20 Alternative 12-67
Table 13.1-1 1992 Existing Unsignalized Intersection Level of Service 13-6
Table 13.1-2 1992 Existing Road Segment Level of Service 13-8
Table 13.1-3 Town of Origin Grafton Station Projected Ridership - Year 1996 13-9
Table 13.1-4 1996 Signalized Intersection Level of Service - A.M. Peak Hours 13-12
Table 13.1-5 1996 Signalized Intersection Level of Service - P.M. Peak Hours 13-12
Table 13.1-6 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours 13-13
Table 13.1-7 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours 13-14
Table 13.1-8 1996 Road Segment Level of Service A.M. Peak Hours 13-14
Table 13.1-9 1996 Road Segment Level of Service - P.M. Peak Hours 13-15
Table 13.1-10 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Grafton Station Only) 13-17
Table 13.1-11 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Grafton Station Only) 13-17
Table 13.1-12 1996 Peak Hour Unsignalized Intersection Level of Service - A.M. Peak Hours (Grafton Station Only) 13-18
Table 13.1-13 1996 Peak Hour Unsignalized Intersection Level of Service - P.M. Peak Hours (Grafton Station Only) 13-19
Table 13.1-14 1996 Road Segment Level of Service - A.M. Peak Hours (Grafton Station Only) 13-19
Table 13.1-15 1996 Road Segment Level of Service - P.M. Peak Hours (Grafton Station Only) 13-20
Table 13.1-16 2001 Signalized Intersection Level of Service - A.M. Peak Hours 13-21
Table 13.1-17 2001 Signalized Intersection Level of Service - P.M. Peak Hours 13-21
Table 13.1-18 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours 13-22
Table 13.1-19 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours 13-23

Table 13.1-20 2001 Road Segment Level of Service - A.M. Peak Hours 13-23
Table 13.1-21 2001 Road Segment Level of Service - P.M. Peak Hours 13-24
Table 13.2-1 1996 CO Concentrations - Route 140/Route30/East Street Intersection, Grafton 13-25
Table 13.4-1 Peak Runoff Rates Grafton Station 13-31
Table 14.1-1 1992 Existing Signalized Intersection Level of Service 14-6
Table 14.1-2 1992 Existing Unsignalized Intersection Level of Service 14-7
Table 14.1-3 1992 Existing Road Segment Level of Service 14-8
Table 14.1-4 Town of Origin Westborough Station Projected Ridership - Year 1996 14-8
Table 14.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours 14-12
Table 14.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours 14-13
Table 14.1-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours 14-13
Table 14.1-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours 14-14
Table 14.1-9 1996 Road Segment Level of Service - A.M. Peak Hours 14-15
Table 14.1-10 1996 Road Segment Level of Service - P.M. Peak Hours 14-15
Table 14.1-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Westborough Station Only) 14-16
Table 14.1-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Westborough Station Only) 14-16
Table 14.1-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Westborough Station Only) 14-17
Table 14.1-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Westborough Station Only) 14-18
Table 14.1-15 1996 Road Segment Level of Service - A.M. Peak Hours (Westborough Station Only) 14-19
Table 14.1-16 1996 Road Segment Level of Service - P.M. Peak Hours (Westborough Station Only) 14-19
Table 14.1-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours 14-22
Table 14.1-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours 14-22
Table 14.1-19 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours 14-23
Table 14.1-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours 14-24

Table 14.1-21 2001 Road Segment Level of Service - A.M. Peak Hours 14-25
Table 14.1-22 2001 Road Segment Level of Service - P.M. Peak Hours 14-25
Table 14.2-1 1996 CO Concentrations - Route 9/Otis Street Intersection 14-26
Table 14.4-1 Peak Runoff Rates Westborough Station 14-30
Table 15.1-1 1992 Existing Signalized Intersection Level of Service 15-7
Table 15.1-2 1992 Existing Unsignalized Intersection Level of Service 15-7
Table 15.1-3 1992 Existing Road Segment Level of Service 15-8
Table 15.1-4 Projected Patrons of Southborough Station Year 1996 . . . 15-10
Table 15.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours 15-13
Table 15.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours 15-14
Table 15.1-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours 15-14
Table 15.1-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours 15-15
Table 15.1-9 1996 Road Segment Level of Service - A.M. Peak Hours 15-15
Table 15.1-10 1996 Road Segment Level of Service - P.M. Peak Hours 15-16
Table 15.1-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Southborough Station Only) 15-18
Table 15.1-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Southborough Station Only) 15-19
Table 15.1-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Southborough Station Only) 15-20
Table 15.1-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Southborough Station Only) 15-21
Table 15.1-15 1996 Road Segment Level of Service - A.M. Peak Hours (Southborough Station Only) 15-21
Table 15.1-16 1996 Road Segment Level of Service - P.M. Peak Hours (Southborough Station Only) 15-22
Table 15.1-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours 15-23
Table 15.1-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours 15-23
Table 15.1-19 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours 15-24
Table 15.1-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours 15-25
Table 15.1-21 2001 Road Segment Level of Service - A.M. Peak Hours 15-25

Table 15.1-22 2001 Road Segment Level of Service - P.M. Peak Hours 15-26
Table 15.2-1 1996 CO Concentrations - Route 85/Route 30 Intersection 15-27
Table 16.1-1 1992 Existing Signalized Intersection Level of Service 16-8
Table 16.1-2 1992 Existing Unsignalized Intersection Level of Service 16-9
Table 16.1-3 1992 Existing Road Segment Level of Service 16-9
Table 16.1-4 Town of Origin Ashland Station Projected Ridership - Year 1996 16-11
Table 16.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours 16-15
Table 16.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours 16-16
Table 16.1-7 1996 Unsignalized Intersection Level of Service - A.M Peak Hours 16-17
Table 16.1-8 1996 Unsignalized Intersection Level of Service - P.M Peak Hours 16-18
Table 16.1-9 1996 Road Segment Level of Service - A.M Peak Hours 16-19
Table 16.1-10 1996 Road Segment Level of Service - P.M Peak Hours 16-19
Table 16.1-11 1996 Signalized Intersection Levels of Service - A.M Peak Hours (Ashland Station Only) 16-22
Table 16.1-12 1996 Signalized Intersection Levels of Service - P.M Peak Hours (Ashland Station Only) 16-23
Table 16.1-13 1996 Unsignalized Intersection Level of Service - A.M Peak Hours (Ashland Station Only) 16-24
Table 16.1-14 1996 Unsignalized Intersection Level of Service - P.M Peak Hours (Ashland Station Only) 16-25
Table 16.1-15 1996 Road Segment Level of Service - A.M Peak Hours (Ashland Station Only) 16-26
Table 16.1-16 1996 Road Segment Level of Service - P.M Peak Hours (Ashland Station Only) 16-26
Table 16.1-17 2001 Signalized Intersection Levels of Service - A.M Peak Hours 16-28
Table 16.1-18 2001 Signalized Intersection Levels of Service - P.M Peak Hours 16-29
Table 16.1-19 2001 Unsignalized Intersection Level of Service - A.M Peak Hours 16-30
Table 16.1-20 2001 Unsignalized Intersection Level of Service - P.M Peak Hours 16-31
Table 16.1-21 2001 Road Segment Level of Service - A.M Peak Hours 16-32
Table 16.1-22 2001 Road Segment Level of Service - P.M Peak Hours 16-32

Table 16.2-1 1996 CO Concentrations - Main Street/Union Street Intersection 16-33
Table 16.4-1 Peak Rates of Runoff North Side, Ashland Station-East . . . 16-39
Table 16.4-2 Peak Rates of Runoff South Side, Ashland Station-East . . . 16-39
Table 17.2-1 Ridership Impacts of Regional Station at I-495 Year 2011 17-2
Table 17.3-1 Comparative Construction Cost Estimates, Alternative Regional Station Sites 17-10

LIST OF FIGURES

Figure ES-1 Commuter Rail Lines ES-4
Figure ES-2 Project Service Area ES-7
Figure 1.1-1 Locus Map 1-2
Figure 1.1-2 Project Corridor 1-4
Figure 1.3-1 Regional Highway System 1-15
Figure 2.2-1 Project Service Area 2-3
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 1 of 8 3-4
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 2 of 8 3-5
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 3 of 8 3-6
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 4 of 8 3-7
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 5 of 8 3-8
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 6 of 8 3-9
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 7 of 8 3-10
Figure 3.1-1 Proposed Railroad Corridor Improvements - Panel 8 of 8 3-11
Figure 3.2-1 Site Plan - Interim Station Worcester, MA 3-13
Figure 3.2-2 Site Plan - Municipal Lots Worcester, MA 3-14
Figure 3.2-3 Typical Section - Mini High Platform 3-17
Figure 3.2-4 Plan - Ramp and Pedestrian Bridge 3-18
Figure 3.2-5 Elevation - Ramp and Pedestrian Bridge 3-19
Figure 3.2-6 Locus Map, Millbury Station Alternatives 3-21
Figure 3.2-7 Site Plan, Route 122 Alternative, Millbury, MA 3-22
Figure 3.2-8 Site Plan, Route 20 Alternative, Millbury, MA 3-23
Figure 3.2-9 Site Plan, Grafton, MA 3-26
Figure 3.2-10 Site Plan, Westborough, MA 3-28

Figure 3.2-11 Site Plan, Southborough, MA 3-31
Figure 3.2-12 Locus Map - Ashland Station Alternatives 3-34
Figure 3.2-13 Site Plan, Ashland East Alternative 3-35
Figure 3.2-14 Site Plan, Ashland West Alternative 3-36
Figure 3.3-1 Site Plan - Layover Facility, Worcester, MA 3-38
Figure 4.1-1 Feasibility Study Alternative Lines/Stations 4-3
Figure 7.0-1 Environmental Resources Project Corridor - Panel 1 of 8 7-2
Figure 7.0-1 Environmental Resources Project Corridor - Panel 2 of 8 7-3
Figure 7.0-1 Environmental Resources Project Corridor - Panel 3 of 8 7-4
Figure 7.0-1 Environmental Resources Project Corridor - Panel 4 of 8 7-5
Figure 7.0-1 Environmental Resources Project Corridor - Panel 5 of 8 7-6
Figure 7.0-1 Environmental Resources Project Corridor - Panel 6 of 8 7-7
Figure 7.0-1 Environmental Resources Project Corridor - Panel 7 of 8 7-8
Figure 7.0-1 Environmental Resources Project Corridor - Panel 8 of 8 7-9
Figure 7.3-1 Typical L_{dn} Values and Criteria 7-14
Figure 7.3-2 Dependence of Maximum Sound Levels on Vehicle Speed (at 50 ft) 7-15
Figure 7.4-1 KEY MAP Corridor Drainage and Wetlands Related to New Track Work - Panel 1 of 3 7-31
Figure 7.4-1 KEY MAP Corridor Drainage and Wetlands Related to New Track Work - Panel 2 of 3 7-32
Figure 7.4-1 KEY MAP Corridor Drainage and Wetlands Related to New Track Work - Panel 3 of 3 7-33
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 1 of 16 7-34
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 2 of 16 7-35
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 3 of 16 7-36
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 4 of 16 7-37

Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 5 of 16 7-38
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 6 of 16 7-39
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 7 of 16 7-40
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 8 of 16 7-41
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 9 of 16 7-42
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 10 of 16 7-43
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 11 of 16 7-44
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 12 of 16 7-45
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 13 of 16 7-46
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 14 of 16 7-47
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 15 of 16 7-48
Figure 7.4-2 Corridor Drainage and Wetlands Map - Sheet 16 of 16 7-49
Figure 7.4-3 Drainage and Wetlands Impact Details 7-50
Figure 7.6-1 Westborough Cedar Swamp Area of Critical Environmental Concern 7-60
Figure 9.0-1 Site Plan-Layover Facility, Worcester, MA 9-2
Figure 9.3-1 Octave Bank Sound Spectra from Idling MBTA Locomotives 9-9
Figure 9.5-1 Site Plan Hazardous Materials Investigation (21E), Worcester, MA 9-13
Figure 10.1-1 A.M. Peak Hour 7:30 - 8:30 A.M. 1992 Existing Conditions INTERIM STATION, Worcester 10-2
Figure 10.1-2 P.M. Peak Hour 4:30 - 5:30 P.M. 1992 Existing Conditions INTERIM STATION, Worcester 10-3
Figure 10.1-3 Distribution of Commuter Rail Station Traffic 1996 INTERIM STATION, Worcester 10-7
Figure 12.0-1 Site Plan, Route 122 Alternative - Millbury, MA 12-3
Figure 12.0-2 Site Plan, Route 20 Alternative - Millbury, MA 12-4

Figure 12.1-1 A.M. Peak Hour 7:15 - 8:15 A.M. 1992 Existing Conditions MILLBURY STATION - Route 122 12-6
Figure 12.1-2 P.M. Peak Hour 5:00 - 6:00 P.M. 1992 Existing Conditions MILLBURY STATION - Route 122 12-7
Figure 12.1-3 1992 Average Daily Traffic and 1992 Average Weekday Traffic MILLBURY, MA - Route 122 12-10
Figure 12.1-4 Distribution of Commuter Rail Station Traffic 1996 BUILD ALL STATIONS MILLBURY STATION - ROUTE 122 12-13
Figure 12.1-5 Distribution of Commuter Rail Station Traffic 1996 BUILD Millbury Only MILLBURY STATION - ROUTE 122 12-19
Figure 12.13-1 A.M. Peak Hour 7:15 - 8:15 A.M. 1992 Existing Conditions MILLBURY STATION - Route 20 12-42
Figure 12.13-2 P.M. Peak Hour 5:00 - 6:00 P.M. 1992 Existing Conditions MILLBURY STATION - Route 20 12-43
Figure 12.13-3 1992 Average Daily Traffic & 1992 Average Weekday Traffic MILLBURY, MA - Route 20 12-46
Figure 12.13-4 Distribution of Commuter Rail Station Traffic 1996 BUILD ALL STATIONS MILLBURY STATION - ROUTE 20 12-49
Figure 12.13-5 Distribution of Commuter Rail Station Traffic 1996 BUILD Millbury Only MILLBURY STATION - ROUTE 20 12-55
Figure 13.0-1 Site Plan - Grafton, MA 13-2
Figure 13.1-1 A.M. Peak Hour 7:30 - 8:30 A.M. 1992 Existing Conditions GRAFTON STATION 13-4
Figure 13.1-2 P.M. Peak Hour 4:45 - 5:45 P.M. 1992 Existing Conditions GRAFTON STATION 13-5
Figure 13.1-3 1992 Average Daily Traffic & 1992 Average Weekday Traffic GRAFTON STATION 13-7
Figure 13.1-4 Distribution of Commuter Rail Station Traffic 1996 BUILD ALL STATIONS GRAFTON STATION 13-10
Figure 13.1-5 Distribution of Commuter Rail Station Traffic 1996 BUILD Grafton Only GRAFTON STATION 13-16
Figure 13.4-1 Water Supply Protection Overlay District Town of Grafton, MA 13-32
Figure 13.9-1 Site Plan Hazardous Materials Investigation (21E), Grafton, MA 13-37

Figure 14.0-1 Site Plan, Westborough, MA 14-2
Figure 14.1-1 A.M. Peak Hour 7:30 - 8:30 A.M. 1992 Existing Conditions WESTBOROUGH STATION 14-4
Figure 14.1-2 P.M. Peak Hour 4:45 - 5:45 P.M. 1992 Existing Conditions WESTBOROUGH STATION 14-5
Figure 14.1-3 1992 Average Daily Traffic & 1992 Average Weekday Traffic WESTBOROUGH, MA 14-9
Figure 14.1-4 Distribution of Commuter Rail Station Traffic 1996 BUILD ALL STATIONS WESTBOROUGH STATION 14-11
Figure 14.1-5 Distribution of Commuter Rail Station Traffic 1996 BUILD Westborough Only WESTBOROUGH STATION 14-20
Figure 14.4-1 AQUIFER AND WATERSHED PROTECTION DISTRICTS Town of Westborough, MA 14-32
Figure 14.9-1 Site Plan - Hazardous Materials Investigation (21E) WESTBOROUGH, MA 14-36
Figure 14.10-1 Hocomonco Pond Superfund Site 14-38
Figure 15.0-1 Site Plan, Southborough Station 15-2
Figure 15.1-1 A.M. Peak Hour 7:30 - 8:30 A.M. 1992 Existing Conditions SOUTHBOROUGH STATION 15-5
Figure 15.1-2 P.M. Peak Hour 4:45 - 5:45 P.M. 1992 Existing Conditions SOUTHBOROUGH STATION 15-6
Figure 15.1-3 1992 Average Daily Traffic & 1992 Average Weekday Traffic SOUTHBOROUGH, MA 15-9
Figure 15.1-4 Distribution of Commuter Rail Station Traffic 1996 BUILD ALL STATIONS SOUTHBOROUGH STATION . . . 15-12
Figure 15.1-5 Distribution of Commuter Rail Station Traffic 1996 BUILD Southborough Only SOUTHBOROUGH STATION 15-17
Figure 15.9-1 Site Plan Hazardous Materials Investigation (21E) - Southborough, MA 15-37
Figure 16.0-1 Site Plan - Ashland East Alternative 16-2
Figure 16.0-2 Site Plan - Ashland West Alternative 16-3
Figure 16.1-1 A.M. Peak Hour 7:30 - 8:30 A.M. 1992 Existing Conditions ASHLAND STATION-EAST 16-5
Figure 16.1-2 P.M. Peak Hour 5:00 - 6:00 P.M. 1992 Existing Conditions ASHLAND STATION-EAST 16-6
Figure 16.1-3 1992 Average Daily Traffic & 1992 Average Weekday Traffic ASHLAND, MA 16-10

Figure 16.1-4 Distribution of Commuter Rail Station Traffic 1996 BUILD ALL STATIONS ASHLAND STATION-EAST 16-13
Figure 16.1-5 Distribution of Commuter Rail Station Traffic 1996 BUILD Ashland Only ASHLAND STATION-EAST 16-20
Figure 16.9-1 Site Plan Hazardous Materials Investigation (21E), Ashland, MA 16-44
Figure 16.9-2 Nyanza Superfund Site 16-46
Figure 17.3-1 Regional Station Study Area, Westborough, MA 17-5
Figure 17.3-2 Alternative Regional Station Sites, Westborough, MA 17-6
Figure 19.1-1 Pedestrian Levels of Service 19-3
Figure 19.2-1 Approach and Platform Trackage 19-6

EXECUTIVE SUMMARY

The Massachusetts Bay Transportation Authority (MBTA) proposes to restore the Worcester-Boston commuter rail service discontinued in 1975 ("the Worcester Extension project" or "the project"). In August, 1992, the MBTA submitted to the Secretary of Environmental Affairs ("the Secretary"), under various provisions of the regulations for the Massachusetts Environmental Policy Act (MEPA) which she administers, an Environmental Notification Form (ENF) on the Worcester Extension project. A project's ENF is the basis on which the Secretary determines whether it requires further environmental review. In October, 1992, the Secretary determined that the project required an Environmental Impact Report (EIR), a full study of the project's impacts and of mitigation that these impacts may require. That same month the MBTA agreed that the project would be reviewed under MEPA as a Major and Complicated project, with a Special Procedure for the MEPA review. The Special Procedure contemplated a comprehensive Draft EIR (DEIR) on the whole project, at about a 30% design stage, and then either a single Final EIR (FEIR) on the project, or FEIRs on various project elements, all FEIRs to be at the 60% design stage. The Special Procedure established a Citizens Advisory Committee (CAC) to assist the Secretary with the project's MEPA review. The project's ENF, EIR decision and Special Procedure appear at the end of this volume of the DEIR.

What follows is an Executive Summary of the MBTA's Worcester Extension project DEIR. The DEIR will go through a period of public comment, after which the Secretary will determine its adequacy. If the DEIR is determined to be adequate, one or more FEIRs on the project will then follow, in accordance with the Special Procedure.

Project Background

The project supports two interrelated public policy goals, reducing traffic congestion on the Massachusetts Turnpike (I-90) and in downtown Boston and improving air quality for the Boston metropolitan region.

Traffic congestion has been a complicated public policy problem for the Boston metropolitan area for decades, as it has been for most American cities. The same causes underlie this problem for all older cities like Boston: increasing automobile use per capita; residential suburbanization; and the continued viability of the downtown business core as a preferred employment location for the myriad of specialized services needed by the entire metropolitan area. The same solution to the traffic problem has been tried in these cities: expanded center-suburb highway capacity. Locally, this solution is reflected in the 1948 Master Highway Plan for the Boston Metropolitan Area, which became, for the next 20 years, the work plan on the basis of which much of the center-suburb roadway capacity now in place in metropolitan Boston was put in place. By the late 1960's, however, the limits of this solution were becoming clear. Citizen activists and progressive transportation experts increasingly opposed the landtakings and neighborhood disruption new center-suburb highway capacity would entail, particularly since the demand for that new capacity appeared, from the perspective of the times, insatiable.

On the basis of the technical conclusions of the Boston Transportation Planning Review in the early 1970's and the continued political pressure from activists opposing highways, Governor Francis Sargent began the forging of new transportation priorities for metropolitan Boston based on improved public transportation. The planning, construction and operation of this revitalized system has been the job of the metropolitan Boston area's public transportation manager, the MBTA. [Federal initiatives have complemented the state's initiatives, most recently the Intermodal Surface Transportation Efficiency Act (ISTEA) enacted in 1991. A relatively brief surge in Federal transit assistance was enjoyed by the States in the 1970's as well.] Since the early 1970's a number of important new MBTA projects have been placed in operation to serve downtown Boston, from within the city and from its inner suburbs inside Route 128, and from the outer suburbs beyond Route 128 as well. All the new service for downtown Boston from the outer suburbs involved revitalizing existing commuter rail lines and, later, extending these lines out to the expanding edge of the Boston employment market. The Worcester Extension project is part of this extension program, which also includes, among others, service extensions to Newburyport on the North Shore, and to several locations on the South Shore using restored Old Colony corridors. With the completion of the Worcester, Newburyport, and South

Shore commuter rail projects, the MBTA's extension program will be largely completed. Figure ES-1 shows all the MBTA's existing and planned commuter rail lines, including the Worcester Extension project.

While center-suburb traffic management was one driving force behind the vast program of MBTA public transportation improvements now nearing completion, air quality in the Boston metropolitan area has emerged as a independent concern, particularly since the 1990 amendments to the Clean Air Act. The 1990 Clean Air Act amendments place all the states whose air did not meet federal standards in 1990 on strict timelines, longer for states with more serious problems, for meeting and thereafter maintaining those standards. By 2007 California, the only state with what the 1990 amendments classified as "extreme" air quality problems, must comply with all the federal standards. Massachusetts, whose problems are classified as "serious," must comply by 1999. The chief Massachusetts problem is ozone, whose precursors, volatile organic compounds (VOCs) and oxides of nitrogen (NO_x), must be reduced about 25% from present levels of in-state generation. The penalties for non-compliance include possible loss of federal highway funds and reclassification into the next highest category of Clean Air Act air quality, "severe. "Both the "severe" and "extreme" classifications under the 1990 amendments impose extensive and very costly air quality control burdens on states and could seriously constrain economic development in Massachusetts.

Massachusetts's air has been getting cleaner for the past 15 years. But as the traditional target of clean air strategists, "stationary sources" of air pollution like industrial smokestacks or electric power plants, have either reduced emissions because of improved control technologies or gone away because of economic changes, the other major source of dirty air, "mobile sources" and chiefly automobiles, have taken on a new and more menacing role. For even as individual new automobiles, because of the pressures of more stringent federal standards, operate with fewer and less toxic emissions, there are more cars on the road than ever before, and the average annual mileage driven per car is rising. In metropolitan Boston, several factors are behind this expanded automobile use. These include continued residential suburbanization, to the areas between Route 128 and I-495 and now even beyond; a newer phenomenon of increasing employment growth outside downtown Boston at major highway intersections and interchanges; and, perhaps undergirding these both, dramatic new wealth: between 1970 and 1990 Massachusetts, per capita, went from being among the poorer to among the richest of the U.S. industrial states. Together, those factors threaten Massachusetts's compliance with its 1999 Clean Air Act deadline.

Every state under a Clean Air Act timeline must have a plan, called a State Implementation Plan or SIP, for timely meeting the federal standards. The plan

MBTA Commuter Rail System Extensions

* Greenbush Branch under study.

Massachusetts Bay Transportation Authority

COMMUTER RAIL LINES

FIGURE ES-1

represents that state's allocation of the relative burdens of further improvements in air quality. Because so much progress has already been made in Massachusetts in making stationary sources cleaner, much of the remaining burden of meeting the 1999 deadline will fall on mobile sources. And while mandatory federal auto emission standards, along with the Commonwealth's decision to impose even tougher voluntary federal auto emission standards, will mean increasingly cleaner cars on the state's roadways, only reducing overall auto travel can ensure Massachusetts will meet the 1999 deadline. A clear means to this reduction is an efficient public transportation system. And so the Massachusetts SIP contains extensive commitments to keep operating virtually all existing MBTA services, and to start operating several additional planned MBTA services, in Boston itself and throughout the metropolitan area. Among the planned services included in the SIP are the unfinished commuter rail projects just discussed, including the Worcester Extension project, which is to be operational by December 31, 1996 unless infeasible due to adverse engineering, environmental or economic impact. This DEIR shows the Worcester Extension project is not infeasible for any of these, or for any other, reasons.

Thus, the MBTA's rebuilding of metropolitan Boston's public transportation system, which began in the 1970's as an alternative to road building for combatting traffic congestion, is nearing completion in the 1990's with another central goal to serve: helping Massachusetts to meet federal air quality standards by 1999, and to maintain them thereafter. The Worcester Extension project will serve both goals.

Project Need

The Worcester Extension project will play an important part of the Commonwealth's overall strategy for reducing traffic congestion in downtown Boston and improving air quality for the Boston metropolitan region by providing a reliable public transportation alternative to the rapidly growing number of commuters to Boston from communities west of Boston near and beyond I-495 whose numbers will increasingly test the capacity of existing radial highways carrying commuters to and from Boston, especially the Massachusetts Turnpike.

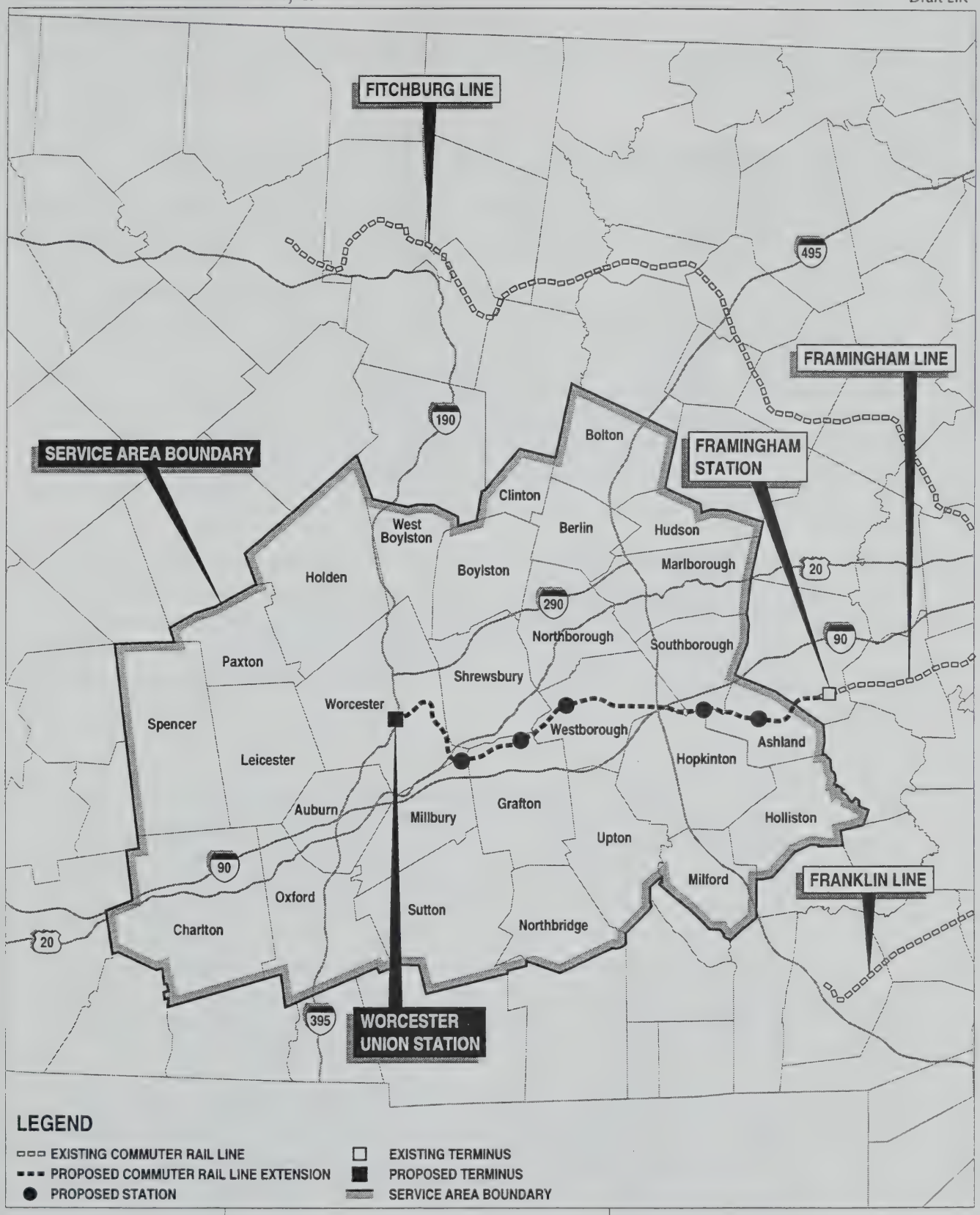
Local rail service between Worcester and Boston ran continuously between 1835 and 1975, and freight and intercity passenger service runs to this day. Particularly after World War II, increasingly widespread automobile use led to increasing suburbanization, and to an extensive highway building program in the Boston metropolitan area, as throughout the Nation. The chief elements of Boston's existing

rim-and-spoke highway system began with the construction of Massachusetts Route 128 (now also, in large part, I-95) in the mid-1950's and were in place by the mid-1960's with the completion of the Massachusetts Turnpike Extension from Weston to Boston. Increasingly easy automobile travel to downtown Boston, eased in part by an increasing shift of overall employment to locations outside Boston, led to widespread declines, throughout Boston as throughout most of the Nation's metropolitan areas, in commuter rail usage, and to declines as well of existing railbeds, stations, rolling stock and equipment.

Nonetheless, the continued movement of population out of Boston proper has not been matched by a decline in employment in the downtown Boston area. Instead, employment in downtown Boston has continued to grow strongly, and is expected to continue to grow steadily in the coming decades. It is the interaction between these two phenomena–continued residential suburbanization and continued strong job growth in downtown Boston–that is the driving force behind the Worcester Extension project and MBTA extension projects to Newburyport and the South Shore. The demographics which, by 1975, had led to low patronage for Worcester/Boston commuter rail service, have changed dramatically less than twenty years later. The MBTA estimates that patrons for the Worcester Extension service will be drawn from towns whose centroids are approximately 6 miles or fewer from the rail line, and from not much beyond 10 miles from the rail line. This comprises 28 communities, illustrated on Figure ES-2, which the MBTA projects will form the core service area for the Worcester Extension project. In these 28 communities, population increased only 8 per cent between 1980 and 1990, but the work force has grown 23 per cent, and work trips to Boston proper and to Cambridge have increased, respectively, 72 per cent and 151 per cent. Large real increases between 1980 and 1990 are involved, moreover. Altogether, the 28 service area communities generated just over 6,000 work trips to the Boston area in 1980, and some 11,000 work trips in 1990. The Worcester Extension project aims to capture approximately 2,100 riders in 1996, 2,300 riders in 2001, 2,500 riders in 2006, and 2,700 riders in 2011.

Project Elements

The Worcester Extension project will comprise four key physical elements: corridor upgrading; up to five intermediate stations; a layover facility for staging morning inbound trains; and an interim Worcester station. Service may be expanded if sufficient demand materializes.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 6 Miles

0 6

PROJECT SERVICE AREA

FIGURE ES-2

Corridor Upgrading

Existing commuter service between Boston and Framingham operates on tracks owned by the MBTA. (Conrail also uses these tracks.) The new Worcester service will operate on the Conrail mainline between Framingham and Worcester. Significant improvements on this mainline will be needed to accommodate both existing Conrail freight and Amtrak intercity service and the new Worcester service. About three miles of eastbound track in Worcester will need upgrading. Though double tracks will need to be restored over about seven miles through Millbury, Grafton and Westborough, the roadbed is generally in adequate condition to allow this restoration. Additional track and signal work will be undertaken throughout the corridor to allow 70 mile per hour passenger train operations. As part of the project, track will be lowered beneath up to seven bridges, creating a 21 foot vertical clearance to allow for passage of Conrail's double-stack containers.

Four bridges–at Hamilton Street in Worcester, at Pine Street in Grafton, at High Street in Ashland, and at Fountain Street in Framingham–will be replaced by the Massachusetts Highway Department and must be coordinated with this project. This track lowering and bridge replacement is actually required for improved freight service but, if done now, will allow the new Worcester service to continue undisturbed once it is underway.

Intermediate Stations

The MBTA's ridership estimates assume the construction of five intermediate stations. These are currently proposed for Millbury, off either Route 122 opposite Exit 11 of the Massachusetts Turnpike or off Route 20 in Worcester; for Grafton, off Pine Street near Route 30; for Westborough, off Smith Valve Parkway; for Southborough, at Route 85 and Southville Road; and for Ashland,either off Pleasant Street and Route 135, or off High Street and Route 135. Some of the five stations have not yet received final local endorsement; the MBTA will construct only intermediate stations which receive the host community's approval. No regional station is being considered for the project at this time because of the cost and other difficulties posed by candidate sites.

Each intermediate station design will include common essentials. There will be separate 800′ inbound and outbound platforms, each with 45′ raised "mini-high" platforms to make trains handicapped-accessible. Canopies and windbreak screens will shelter waiting passengers. Intertrack fencing will discourage pedestrians from crossing the tracks; pedestrian bridges, with stairs and ramps to allow access for the handicapped, will allow such crossings. Each station will provide parking lots sized for projected demand, subject to land availability, though the Southborough station

is constrained by available land to 420 parking spaces. All stations will have bike racks and benches, hookups for telephones and vending machines, suitable landscaping, and low-spillover lights which, to minimize annoyance to neighbors, will shut off one-half hour after the last evening train passes through.

Layover Facility

The proposed layover facility is an existing railyard in Worcester. It is proposed for the outer terminus of the Worcester line, near where trains will end each day's service and will be needed to begin each day's service. (Trains originating in Boston would provide morning service to Worcester.) The proposed layover facility can accommodate four train sets with necessary support facilities. Wayside power will be provided to limit the amount of locomotive idling required, particularly during cold weather.

Worcester Station

The existing Amtrak station in downtown Worcester, north of the railroad tracks, will be modified and expanded so as also to serve as an interim station. The existing platform will be reconstructed and a new mini-high platform constructed to ensure access for the disabled. A new parking lot will be constructed, supplemented by parking at existing nearby municipal lots. The site's lighting will be upgraded, and the site will be landscaped and equipped with benches and proper signs.

Eventually, Worcester passengers will use a redeveloped Union Station, about 700 feet west of the Amtrak station. The redevelopment of Union Station, jointly by the Worcester Regional Transit Authority and the Worcester Redevelopment Authority, is undergoing separate MEPA review under EOEA #9521. Union Station's opening is planned for November, 1997.

Service

The MBTA began interim Worcester Extension service, express between Worcester and Framingham, on September 26, 1994. Service will be weekdays only, three trains inbound during the morning commute, three trains outbound during the evening commute. By 1996, the intermediate stations are expected to have been constructed, and basic service will then begin, with ten operations weekdays each way, four during peak commuting hours. If demand exists, expanded service could provide up to six additional off-peak trains weekdays each way.

Project Alternatives

Overall Alternatives

In addition to "No Build", which forms the standard environmental baseline against which a project's impacts are assessed, the MBTA considered the public transit alternative of express bus service designed to be roughly equivalent to the project's service for its projected ridership. The key comparisons were around air quality impacts and costs, capital and operating. For peak commuting hours, the bus alternative assumed buses from each intermediate station and Worcester, with express service to Boston. For off-peak times, the assumption was buses serving Ashland, Southborough and Westborough, and then express to Boston, or vice versa; and buses serving Grafton, Millbury and Worcester, and then express to Boston, or vice versa. Bus service comparisons for basic and expanded train service were developed.

The air quality comparison was performed for the years 1996 and 2001. Daily VOC emissions, for basic vs. expanded service, train vs. bus, are comparable and not large, and CO emissions for the bus options exceed those for the train option, but again are not large. For NO_x, however, trains generate significantly more pollutants per day than do buses. Assuming that reductions in NO_x and VOCs are roughly substitutable, all the public transit options analyzed are directionally correct in 1996: they add back fewer contaminants than they remove by diverting automobile trips. In 2001, all the public transit options reduce emissions over the baseline of driving except the expanded train service option, which creates slightly more emissions (because of expanded off-peak service where ridership is very low) than it removes by diverting automobile trips.

The MBTA points out that the air quality comparison of project alternatives does not look at later years when Turnpike congestion is likely to be much worse, based on reasonable extrapolations into the future. Nor does it assess two other factors which, alone and especially cumulatively, could mean higher-than-projected project ridership: one is greater-than-anticipated project utilization, as has happened with the MBTA's Providence-Boston service; the other is greater-than-anticipated population density in the service area, which might lead to higher ridership if even at the same relative concentration of riders to population. Finally, the MBTA points out that the project will be of particular value in the event that, to meet the 1999 Clean Air Act deadline, contingency actions are needed. Important among these contingency actions, suggested by DEP in its November, 1993 SIP submission, could be an expanded program requiring employers to reduce single-occupancy vehicle commuting. Without great trouble and to considerable positive environmental effect, the MBTA could, with more cars per train or more commuting hour trains, quickly

absorb additional commuters, through the project and throughout the commuter rail system.

The alternatives considered in the 1990 Feasibility Study, and their relative costs, are compared, to explain how the project came to be chosen from among the alternatives considered. Net annual cost comparisons are made for the commuter rail preferred alternative and a commuter bus alternative developed for this DEIR.

Layover Facility Alternatives

The MBTA has developed general criteria for locating layover facilities, since they are widely needed for efficient MBTA operations. Generally, the following considerations should be met by a layover facility: it should be near a line's terminus, to minimize movements with empty trains (known, colloquially, as "deadheading"); it should be generally parallel to the main track, or off to its side if the track continues away from the layover facility; it should accommodate four nine-car train sets; it should have double-ended track layout to maximize access to and from the main track; and there should be adequate space for service vehicles, employee parking, a maintenance/office/storage building, and an electric power substation.

Thirteen sites were evaluated; none met all criteria. The three most favored sites were reviewed, but one, near the Bay State Abrasives facility in Westborough, faced significant environmental hurdles to be developed, as it required some filling in the Great Cedar Swamp, an Area of Critical Environmental Concern (ACEC); another, off Smith Valve Parkway in Westborough, was also proposed as Westborough's commuter rail station. This left the third, which was chosen, the Worcester Conrail yard. This site is very close to the project terminus, has few conflicting adjacent land uses, and allows reasonable train storage and service vehicle access, but not ideal maneuvering space.

Station Site Alternatives

The initial station sites considered were those identified in the 1990 feasibility study and those which had been stations before commuter rail service was discontinued in 1975. Others considered were sites evaluated by the various local rail committees, available for MBTA purchase, or suggested by local business owners. Sites were evaluated individually and collectively.

Key evaluation criteria for individual sites were: space for opposing 800′ platforms along straight track and for adequate parking; access, favoring property served by relatively major roads away from residential centers or town centers; neighborhood impacts, favoring low traffic impacts and disfavoring local street access; land availability, favoring vacant land to minimize relocation costs, taking costs and

demolition costs; environmental impacts, especially disfavoring large wetlands impacts which hamper site development potential; and joint development potential.

Collectively, sites could not make for excessive travel time, the goal being 1 hour between Worcester and Boston with all intermediate stops made. Also, the minimum feasible ridership of approximately 2,500 had to be attained; this made a Worcester-only station impossible, and required adding other stations, but such that there was a reasonable tradeoff between added travel time and added passengers. Two of the intermediate stations proposed in the feasibility study, Howe Street in Ashland, and Fruit Street in Westborough, proved, on further examination, to be infeasible, necessitating consideration of other station sites. A regional station at I-495 also proved infeasible, due to scarcity of sites per se, and their cost, access and wetlands problems.

Ultimately, the MBTA decided to seek out a station in each community through which the project's trains would pass, for a total of five intermediate stations in addition to Worcester and Framingham. Eight options were considered for Worcester, with the Union Station terminus ultimately being decided upon once its rehabilitation was complete. For Millbury, a single site area straddling the tracks in the northernmost corner of town was considered, with a station south of the tracks accessed from Route 122 having been originally proposed by the MBTA, and a station north of the tracks accessed from Route 20 in Worcester also considered when opposition to the initial MBTA proposal surfaced. The DEIR evaluates both sites. Grafton considered at least four sites before settling on the Pine Street site as preferable. Westborough considered a number of sites along the seven miles of the project's Westborough corridor. The focus in Southborough was generally on Cordaville, since the Southville area, most residents interested in station siting agreed, was too densely developed. The Ashland rail committee reviewed nine sites, ultimately coming to agree with the MBTA's view that the Pleasant Street area was preferred. Two options in that area, Ashland/East and Ashland/West, are assessed in the DEIR, but Ashland/East is preferred and Ashland/West will be considered only if Ashland/East proves infeasible.

Station Design Alternatives

While some design requirements, such as the need for opposing 800' platforms, drove station site choices, others involved alternatives which required further analysis. Of particular concern to the MBTA has been squaring its needs with the requirements of Conrail, the right-of-way owner, whose main concern is ease of freight operations. The key issues have been track configuration and the conflict between passenger accessibility criteria and freight clearance criteria.

The MBTA and Conrail have come to agree that a fully double-tracked project corridor is essential. In areas like Conrail's Beacon Park yard where there is only one track, delays periodically result. The alternative of a dedicated track each for Conrail and the project was reviewed, but decided against since it was less flexible than both parties using both tracks.

Once the question of two tracks was resolved, one of the passenger access vs. freight clearance issues arose: should there be a single platform between the tracks, or two opposing platforms with the tracks between? A single platform would have required relocating tracks near stations since the required centerline spacing would be 32'-6", as opposed to the current 14'-0". A single platform also poses dangers to fast-moving freight trains, or, alternatively, requires them to move slower.

The other passenger access vs. freight clearance issue turns on handicapped access to the commuter trains. Essentially, the access requirement is to be closer to the passenger coach, while the clearance requirement is for platforms to be sufficiently distant to allow for unencumbered wide-load freight movement. Low platforms can address this problem, since there is adequate horizontal clearance for freight service, but low platforms do not provide handicapped access. High platforms provide handicapped access but protrude too much into the required horizontal clearance for freights. The MBTA investigated the option of gauntlet tracks, onto which passenger trains entering a station would switch so as to achieve the required access to the passenger coach. But the added cost per station is $3 to $4 million, and Conrail was concerned about operational issues that the gauntlet tracks posed.

Instead, the MBTA is proposing so-called "mini-high" platforms to provide access for the handicapped. The mini-highs will be equipped with retractable edges to allow for wide-load freight movements. Mini-highs were contemplated for the Worcester extension project in the March, 1990 Memorandum of Understanding between the MBTA and the Massachusetts Architectural Access Board (MAAB). And they will be key in the MBTA's completing an operating rights agreement with Conrail. Full high platforms will obstruct freight movements, and have been judged to be unacceptable by Conrail. Without an MBTA agreement with Conrail, there will be no Worcester Extension project. And without the project, the Commonwealth runs the risk of eventual sanctions for not complying with its own SIP.

Project Socio-Economic Impacts

The MBTA has reviewed several concerns expressed by observers about the Worcester Extension project's possible socio-economic impacts. Among these have been land use impacts in the service area, impacts on local revenues and local property values in communities with stations, and changes in existing MBTA assessments or their possible imposition on service area communities not now in the MBTA district. In general, the Worcester Extension project is not expected to have a significant impact on any of these areas of concern.

Land use

The project's chief effects will be on how people in the service area get to work, and thus only minimally on land use per se. Because the project will make it easier for some people to get to work in Boston, it may marginally stimulate housing demand, since service area housing could appeal to those who could not afford housing closer to Boston; this demand would complement existing demand for housing among those who work in the areas along and between Route 128 and I-495. Nonetheless, how this marginal demand is translated into actual new housing is almost completely under the control of local zoning, wetlands and other regulations affecting land use. Similarly, there may be a marginal stimulus around commercial development, but this too would be a matter very much under local control.

Property values

The effects from the project on property values along the rail line are unlikely to be significant, since there are already extensive operations along the existing rail line, at all hours of the day and night.

Stations, too, are unlikely to have significant property value impacts. Even on immediately nearby housing, a combination of sensitive design, landscaping and lighting should minimize potentially adverse property value effects, while, in a somewhat larger area, there should be small positive impacts on residential property values because of proximity to the new commuter rail stations, if the behavior of the residential property market nearer to Boston is any indicator. In Grafton and Westborough, where the proposed stations are near commercial and industrial property, the stations could have small positive effects on property values, and are certainly consistent with the planned uses of those properties.

Local Revenues

In all but Grafton, where proposed new station sites are privately owned, the relevant host community will lose the applicable property tax revenues when the property is taken or purchased by the MBTA, since the MBTA is exempt from local taxation. Nonetheless, there may, from several properties in the area of any station, be small positive gains in property tax revenue if, because of the Worcester Extension project, new residential or commercial building occurs as a result, or if upward valuations of existing property take place.

MBTA Assessments

Only two communities in the project's service area are now in the MBTA district, Ashland and Framingham, and the MBTA projects their assessment increases, as a result of the project, would each be below one-half of one per cent. The MBTA does not believe it is likely in the foreseeable future that either the assessment calculation rules or the membership of the existing MBTA district will change. Thus the present scale of effects for Ashland and Framingham will likely continue for the future, and no MBTA assessments will likely be levied on other communities in the Worcester Extension project service area.

Project Environmental Impacts

The MBTA comprehensively analyzed all the project elements in the following impact areas: traffic; air quality; noise and vibration; site drainage; wetlands and wildlife; historic sites; archaeological resources; visual impacts; hazardous materials; pedestrian safety; and construction. Traffic was analyzed regionally and for all non-station intersections affected. Corridor impacts analyzed did not extend to impacts from any station area, which were analyzed in the section for that station. Air quality was analyzed regionally for VOCs and NO_x impacts, and locally for potential CO hotspots. Project impacts on the existing Framingham station, on Back Bay Station and South Station in Boston, and on the Worcester interim station, were detailed on matters which the Secretary scoped as a result of the project's ENF review.

Overall, the project significantly reduces vehicle miles travelled by automobiles (VMT) because of the numbers of automobile commuters who would use the train, and has a favorable impact on the air pollutants of regional concern, VOCs and NO_x. Directly, the project reduces overall emissions of these pollutants compared to the alternative of project patrons' driving to Boston; indirectly, the project somewhat

reduces congestion on the Massachusetts Turnpike, thus allowing higher average speeds and reducing pollutants.

While there are no local air quality problems, as carbon monoxide emissions for the various stations suggest, the project-related traffic adversely affects several intersections in Ashland, Southborough and Millbury. Virtually no pedestrians are expected to use the project's stations, so sidewalks outside station areas are not needed as mitigation measures. In deference to local concerns, the MBTA plans to extend sidewalks near the proposed stations in Westborough and Southborough. There are no noise impacts associated with starting interim service; six houses in Grafton may be affected by noise under basic service; under expanded service, 92 houses, in all intermediate station communities but Millbury as well as in Worcester and Framingham, are projected to be affected by noise. Approximately 41 houses, in all five intermediate station communities and in Worcester and Framingham, are projected to be affected by vibration. A number of relatively minor wetlands impacts are expected from the project, from causes ranging from access road installation to buffer zone work; these will require mitigation that will be ordered by the relevant local conservation commission acting under the authority of the Massachusetts Wetlands Protection Act. The layover facility appears to have no wetlands impacts. Generally, there are no anticipated problems at various project sites associated with hazardous materials, though analytical work remains to be completed for Millbury. Of course, a significant exception to this is in Ashland, where discussions are ongoing with the U.S. Environmental Protection Agency (EPA) to determine how a station might be sited near the Nyanza Superfund site so as not to disturb, or preclude options around, ongoing EPA remediation. Significant amounts of work remain to be done before final project impacts can be assessed on historic sites and archaeological resources; this work is ongoing, and will be reported on in the FEIR. Virtually all the project's elements involve construction impacts, but all will be relatively short-term.

Project Mitigation

MEPA requires that the impacts from projects, whether public or private, be identified, minimized, and mitigated where feasible and where the project is the cause of unacceptable impacts. Not all impacts from a project require mitigation. The MBTA understands there are various local proposals for mitigation, but emphasizes that, since the Worcester Extension project is itself a required air quality mitigation measure under the Massachusetts SIP, its mitigation should be as focussed as possible on setting off impacts clearly traceable to the project.

The MBTA has in some cases used numerical standards to determine what unacceptable impacts would entail. Level of service (LOS) has been used for intersections; LOS is calculated by standard formulas which measure delay at signalized intersections or reserve capacity at unsignalized intersections. For traffic impacts, the traditional standard of unacceptable impact on urban area streets is causing an intersection's LOS to drop from LOS D or above to below LOS D. In addition, the MBTA will evaluate possible traffic mitigation at intersections where the Worcester Extension project might worsen LOS at an intersection already below LOS D before project impacts were considered. Project traffic mitigation will have as its goal returning the level of service to LOS D or better. For noise and vibration, criteria of the Federal Transit Administration and the Massachusetts Department of Environmental Protection (DEP) have been used; the MBTA has also recently adopted the policy of expending up to 2 per cent of project construction costs for noise and vibration impact mitigation, but only where there is a clear benefit from the mitigation cost incurred. Generally, noise increases in excess of 5 dBA will be considered for noise abatement measures. For hazardous materials impacts, the MBTA has used the applicable levels for various kinds of contaminants contained in the October, 1993 update of the Massachusetts Contingency Plan (MCP) adopted under G.L. 21E.

In other cases, the MBTA has used qualitative standards to determine the need for mitigation, for example concerning impacts on wetlands and wildlife from project construction or operations, or on aesthetics, historic sites or archaeological resources. In general, MBTA policy is to avoid such impacts where possible, and to minimize them otherwise through appropriate siting, design and control measures.

Table ES-1 summarizes where project impacts appear now to require mitigation. By impact category, the key mitigation the MBTA is proposing in the DEIR is as follows:

Local Traffic

In Millbury, the intersection of Grafton Street and the Massachusetts Turnpike Exit 11 ramp should be upgraded by making the ramp two lanes to allow two lanes of traffic to turn left onto Grafton Street. Widening Grafton Street will also be required. The improvement applies to the Route 122 station option, not the Route 20 option.

In Grafton, the project's impacts do not require traffic mitigation. Nonetheless, the DEIR notes certain traffic mitigation actions which would improve overall LOS at the intersections of North Main Street with both Bridge Street and Worcester Street. The MBTA will discuss these actions with the Town of Grafton and MHD and report on the results in the FEIR.

In Westborough, the project will not adversely affect any intersections, and no traffic mitigation is proposed.

In Southborough, improvements to set off project impacts at Cordaville Road (Route 85) and Main Street could be made to Cordaville Road only. Nonetheless, a more general overhaul of the intersection would make sense from a long-term perspective. A general overhaul could significantly increase costs even though it would not set off specific project impacts. The MBTA will discuss options with MHD and local officials and report on these discussions in the FEIR. Suggestions from Southborough residents and officials for mitigating project impacts at Cordaville Road and River Street will not, even with the upgraded geometry and signal phasing at the intersection of River Street and Southville Road immediately southward, result in as good a LOS as leaving the intersection of Cordaville Road and River Street open. This too will need discussion among the MBTA, MHD and local officials, and will be reported on in the FEIR. At Woodland Road and Cordaville Road, LOS is F with or without the project. Improvements proposed by the Town of Southborough do not appear to increase the intersection's capacity.

In Ashland, there are longstanding capacity problems to which the project adds marginally; much of the impact from the project's addition could probably be set off by retiming local traffic signals. Larger capacity-addition projects might make sense, and some of them, if pursued contemporaneously with the project, would have to be coordinated carefully as project design and approvals proceeded.

Noise/vibration

The MBTA is considering, subject to further evaluation which will be reported in the FEIR, the construction of approximately 17,000 linear feet of noise barriers to offset unacceptable levels of noise at 92 residences under expanded service. (Only 6 residences will experience unacceptable noise under basic service.) Likewise subject to further evaluation which will be reported in the FEIR, the MBTA is considering the installation of approximately 4,700 linear feet of ballast matting to counter vibration. Factors to be further reviewed for the FEIR in both cases concern feasibility and cost-effectiveness.

Site drainage

At all locations, parking areas will be maintained using best management practices, and stormwater flows will be controlled so as not to exceed current levels. No stormwater facility is proposed for Southborough, because of its peculiar location at the bottom of a large watershed, where rapid stormwater discharge from the area is advisable before stormwater from above reaches the discharge points.

Along the corridor, most drainage facilities, both culverts and ditches, are intact, though many require cleaning. While no new culverts are proposed, some may need slight reconfiguration to accommodate rail and ballast adjustments. This is especially the case at the Pine Street bridge relocation to be undertaken by MHD; culverting in that area may need to be extended. No flood storage impacts are expected along the corridor.

Wetlands

Virtually all the station sites have some potential wetlands impacts, usually minor, save for Ashland/West. Generally, these impacts are connected with such things as defining access roads (Millbury, Grafton, Southborough), the intrusion of some parking into the buffer area (Grafton, Westborough, Southborough) or minor culverting (Ashland/East). Compensatory flood storage will be provided at the Southborough site for approximately 6,200 cubic feet of flood storage lost because of the access road and construction on other southern portions of the site. Parking at Ashland/West would involve altering more than 5,000 square feet of wetlands, and thus extensive permitting and a DEP variance; thus only if all other alternatives prove infeasible will this option be pursued.

Construction

All sites undergoing construction will be managed with standard construction mitigation techniques, including hay bales to control stormwater flow, site watering to minimize dust, use of quietest available equipment, limiting equipment idling, using temporary noise barriers, using low-vibration piling methods, restricting hours of operation, etc. Specific construction noise limits will be developed and incorporated into contract specifications, along with noise monitoring requirements to ensure compliance.

Public Participation

The MBTA has, for some time, been consulting with the rail committees constituted by the Board of Selectmen in each town (other than Grafton, whose Board of Selectmen remained directly involved in the station site selection process) to assess station locations and recommend a preferred location. Periodically, the MBTA and its project consultants have met with these committees to bring new information about the project analyses underway, or to field questions about project concerns that

had surfaced in each locality where a new intermediate station was planned. The MBTA has found these meetings uniformly valuable.

As part of the Special Procedure created for the review of the Worcester Extension project, the Secretary created a Citizens Advisory Committee (CAC). Each local rail committee has a CAC member and others were chosen after a nomination process conducted by the Secretary. The CAC membership list appears in Appendix - Volume II, Section 7.0. The CAC has an overview role with respect to the project, and also certain rights under the MEPA regulations, including the right to 30 days' advance review of the DEIR, the right to request changes in the DEIR, and the right to have its comments circulated with the DEIR if timely filed with the MBTA. The MBTA has met periodically with the CAC, and has gained valuable insights about the project from CAC members.

The CAC's comments on the DEIR appear at the end of this volume.

Table ES-1 Brief Summary of Mitigation Proposed by Area of Impact Analyzed in DEIR

Impact Category	Corridor	Layover	Ashland West	Ashland East	Southborough	Westborough	Grafton	Millbury Route 122	Millbury Route 20	Worcester Interim
Local Traffic	N	N	1996 B: Y 2001 B: Y	1996 B: Y 2001 B: Y	1996 B: Y 2001 B: Y	1996 B: N 2001 B: N	1996 B: N 2001 B: N	1996 B: Y 2001 B: Y	1996 B: N 2001 B: N	N
Air Quality	N	N	N	N	N	N	N	N	N	NA
Noise/Vibration	Y	N	Y	Y	Y	Y	Y	Y	Y	NA
Site Drainage	N	N	Y	N	N	N	Y	Y	Y	NA
Wetlands/ Wildlife	Y	N	Y	N	Y	N	Y	Y	Y	NA
Historic Sites	TC	N	TC	TC	TC	N	TC	N	N	NA
Archaeol. Resources	TC	N	TC	TC	N	TC	TC	TC	TC	NA
Visual Impacts	N	N	N	N	N	N	N	N	N	NA
Haz. Materials	N	N	N	N	N	N	N	TC	TC	NA
Pedest. Safety	Y	N	N	N	Y	N	Y	N	N	NA
Constr. Impacts	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA

Y = impact requiring mitigation
N = no impact, or impact not requiring mitigation
NA = not applicable
TC = to come

In traffic mitigation: 1996B = 1996 Build, 2001B = 2001 Build

DEIR CIRCULATION LIST

Federal

Department of the Army
  Corps of Engineers, New England Division
Department of the Interior
  Fish and Wildlife Service, N.E. Region
Environmental Protection Agency
  Region 1, Environmental Review Office

State

Executive Office of Communities and Development
  State Clearinghouse
Executive Office of Consumer Affairs
  Department of Public Utilities
Executive Office for Environmental Affairs
  Secretary, MEPA Unit
  Department of Environmental Management
    Division of Resource Conservation (Inland ACEC Program)
  Department of Environmental Protection, Boston Office
    Division of Waste Site Cleanup
    Division of Watershed Protection
  Department of Environmental Protection, Central Regional Office
    Division of Wetlands and Waterways
  Department of Environmental Protection, Northeast Regional Office
    Division of Wetlands and Waterways
    Division of Water Pollution Control
  Department of Fisheries and Wildlife and Env. Law Enforcement
    Division of Fisheries and Wildlife
    Massachusetts Natural Heritage Program
  Department of Food and Agriculture, Lancaster Regional Office
    Bureau of Land Use

State (cont.)

Executive Office for Transportation and Construction
Massachusetts Highway Department, Boston Office
Massachusetts Highway Department, District #3
Massachusetts Historical Commission
Massachusetts Architectural Access Board
Massachusetts Water Resources Authority
State Transportation Library

Elected Officials

U.S. Congressman Peter Blute
State Senator Matthew J. Amorello
State Senator Arthur E. Chase
State Senator David P. Magnani
State Senator Robert D. Wetmore
State Representative John J. Binienda
State Representative Stephen M. Brewer
State Representative William Constantino, Jr.
State Representative Barbara Gardner
State Representative William J. Glodis, Jr.
State Representative Emile J. Goguen
State Representative Barbara Gray
State Representative Paul Kollios
State Representative William J. McManus, II
State Representative Kevin O'Sullivan
State Representative Vincent A. Pedone
State Representative Marsha R. Platt
State Representative John A. Stefanini

Regional Agencies

Central Massachusetts Regional Planning Commission
Metropolitan Area Planning Council
Worcester Regional Transit Authority

City of Boston

Environment Department
Transportation Department
Redevelopment Authority
Public Library

City of Worcester

Mayor's Office
City Manager
City Council
Conservation Commission
Planning Board
Office of Planning and Community Development
Department of Traffic Engineering
Redevelopment Authority
Public Library

Town of Millbury

Board of Selectmen
Commuter Rail Study Committee
Conservation Commission
Planning Board
Public Library

Town of Grafton

Board of Selectmen
Conservation Commission
Planning Board
Grafton Water District
Commuter Rail Study Committee
Public Library

Town of Westborough

Board of Selectmen
Commuter Rail Study Committee
Conservation Commission
Historical Commission
Planning Board
Recreation Department
Town Engineer
School Committee
Town Coordinator
Public Library

Town of Southborough

Board of Selectmen
Commuter Rail Study Committee
Conservation Commission
Planning Board
Public Library

Town of Ashland

Board of Selectmen
Conservation Commission
Planning Board
Commuter Rail Study Committee
Town Administrator
Public Library

Town of Framingham

Board of Selectmen
Conservation Commission
Planning Board
Public Library

Town of Hopkinton

Board of Selectmen

Citizens Advisory Committee

Mr. David C. Robbins, Chairman
Mr. Ed Bates
Mr. Robert Gentile
Mr. Dex Malone
Ms. Kathleen Bartolini
Ms. Patricia Murphy-Capone
Mr. James W. Falconi
Mr. Wayne Thies
Mr. Stephen Doret
Ms. Judith McCabe
Mr. Michael O'Bryan
Mr. James R. Waterman
Ms. Lydia Bogar
Mr. John A. Reil
Mr. Edward J. Ropiak
Ms. Margaret A. Lavallee
Mr. Frederick Moseley
Senator Matthew J. Amorello
Ms. Patricia E. Austin
Mr. Peter Stanton
Mr. George Tetler
Mr. Jeffery Dore
Mr. Stephen Bishop
Mr. Karl Gross
Ms. Mary MacAdam
Ms. Jody Young

Private Groups/Others

Massachusetts Audubon Society
Metrowest Growth Management Committee
Sudbury Valley Trustees
Boston Area Bicycle Coalition
Regional Environmental Council of Central Massachusetts
Preservation Worcester

Private Groups/Others (cont.)

Worcester Area Chamber of Commerce
Worcester Business Development Corp.
Brotherhood of Locomotive Engineers
Tufts University Development Corporation
Boston Globe
Boston Herald
Middlesex News
Worcester Telegram and Gazette
Conrail
Peter Pan Bus Lines, Inc.
Cavalier Coach Corporation
Gulbankian Bus Lines
MBTA Advisory Board
Worcester Consortium for Higher Education
Association for Public Transportation, Inc.
City of Newton, Department of Planning & Development
Blackstone River Valley National Heritage Corridor Commission
Green Island/Vernon Hill Community Development Corporation
Joint Regional Transportation Committee
Newton Department of Planning and Development
Environmental Lobby of Massachusetts
Bridgewater State College
Comprehensive Facilities Solutions, Inc.
Bowditch & Dewey, Attorneys at Law
Wyman-Gordon Company
Cutler Associates, Inc.
Deloitte & Touche
Massachusetts Ambulance Association
Leary and Grady, Attorneys at Law
International Muffler & Brake Co.
First American Realty, Inc.
Dolphin Resource Group
Atlas Distributing Corp.
Worcester Marriott Hotel
Target Worcester
Wave, Inc.
Sharfmans Jewelers
F.W. Madigan Company, Inc.
Mass. Biotechnology Research Park
Paul Revere Insurance Group
Astra USA, Inc.
United Way of Central Massachusetts
Anna Maria College
Fallon Clinic, Inc.

Private Groups/Others (cont.)

Worcester Centrum
Fairlawn Rehabilitation Hospital
Massachusetts Electric Company (Worcester)
Massachusetts Electric Company (Westborough)
Flagship Bank
Comlink, Inc.
Allmerica Financial
Coghlin Electric/Electronics
New England Development Corp.
Jeffery R. Silkman Insurance Agency
Worcester State College
Assumption College
Clark University
Clement Hitchings
William and Helen Panas
Robert Lister
Joseph Orlando
A. Donald Marshall
Diane McElvery
Louis and Maureen Jankauskas
Kristina Allen
Charles Kelliher
Robert and Barbara Brais
Jan and Andy Girard
Lawrence Gomes
Arlene Williams
Alden Jefts
Cheryl and Paul Crivello
Warren Catherwood
Frederick Quinn
M. Jeanne Sholl
Robert Banks
Stephen Dixon
Dr. Timothy and Sue Hopkins
Elaine Sanborn
Adele Botehello
Norma Thompson
Robert and Anne Tufts
Dorothy McMahon
Elizabeth Moss
Thelma Leendin
Elizabeth Colbert
Gerald Viscardi
David Goldman

Private Groups/Others (cont.)

Mary Harrington
Gordon Marquis
Joseph Bianculli
Amanda Guyette
Cathy & Marty Tuominen
D. Keith Chenot
Andrew Boyce
Peter Gentile
Lisa Connelly Cook
Elise C. Rosenblatt
Frank D'Elia
Robert Bellerose
Ann Lindblad
M. Allison Hamm
Arthur Fitzgerald
Philip Palmieri
Mary Kane Sullivan
Scott Rossiter
John Woodward

SECTION 1.0 PROJECT OVERVIEW

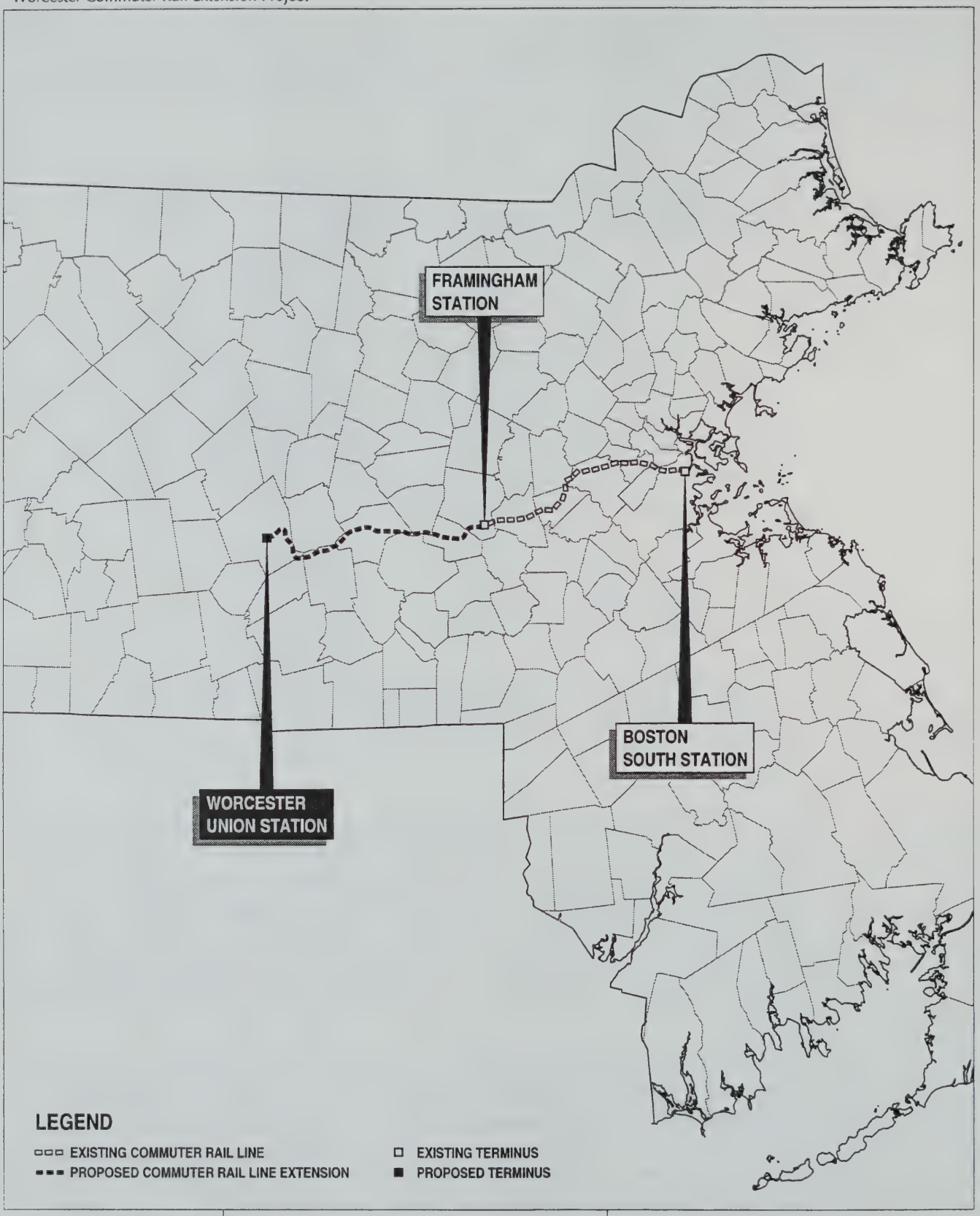
This section provides a brief summary of the proposed project elements (described in detail in Section 3.0), an overview of past and present public transportation in the study corridor, other currently proposed transportation improvements that have a relationship to the commuter rail extension, a history of the project, including MEPA chronology and coordination with project area communities, and concludes with a discussion of the permits and approvals likely to be needed.

1.1 Proposed Project

This Draft Environmental Impact Report addresses the proposed extension of MBTA Commuter Rail Service on the Framingham Line from its present terminus at Framingham Station to a proposed terminus in downtown Worcester (see Figure 1.1-1).

The existing rail line between Framingham and Worcester is owned by Conrail. The proposed commuter rail service will share operations on the line with existing Conrail freight and intercity passenger service by Amtrak. The total number of train operations requires restoration of double track over the westerly 11 miles of the project between Westborough and Worcester, along with overall upgrading of track and signals to permit 70 mph speeds for the project's trains. Trackage upgrades will consist of some seven miles of new second track and four miles of upgraded second track.

The proposed service was initiated on September 26, 1994 by operating "interim" service consisting of three peak hour trains during both the morning and evening commute, running express between Worcester and Framingham. Union Station in Worcester, currently being designed for use as an intermodal transportation facility, is expected to be re-opened in November 1997. While this site will be the ultimate commuter rail terminus, a temporary facility will be constructed at the present Amtrak station in Worcester to serve as an interim station until the Union Station project is complete.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 12 Miles

0 1750

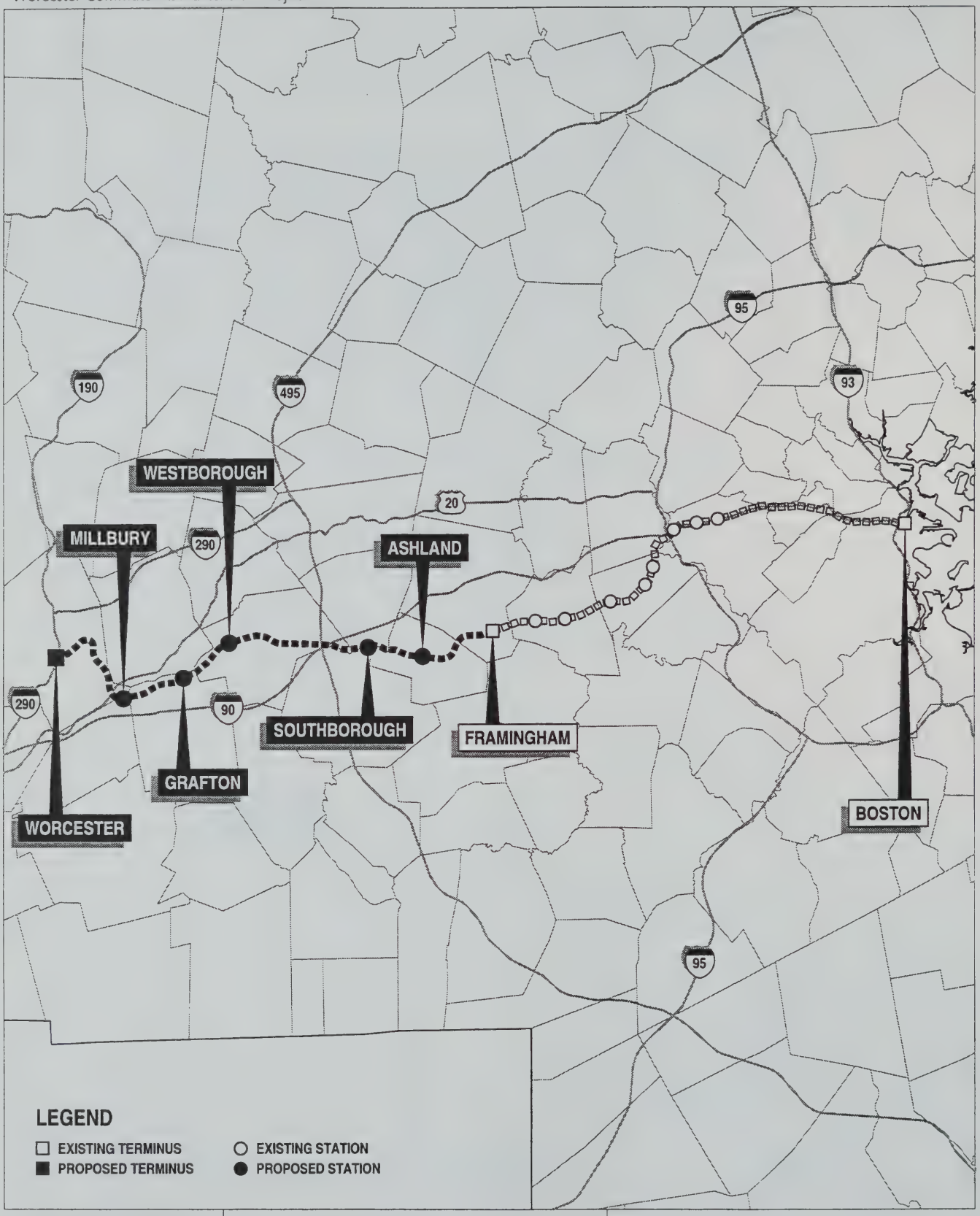
LOCUS MAP

FIGURE 1.1-1

The project proposes construction of intermediate commuter rail stations along the corridor in Millbury, Grafton, Westborough, Southborough, and Ashland (see Figure 1.1-2). Stations will include inbound and outbound platforms, grade separated pedestrian cross-overs of the tracks, platform canopies and wind breaks. Parking for commuters will be provided at each station, with lot size determined by demand for parking spaces. It is anticipated that the intermediate stations will be constructed by 1996, when train operations will be increased to four peak hour trains in the A.M. period and five peak hour trains in the P.M. period, plus off peak service, totalling 20 trains per day. As ridership increases, service could be expanded to 32 trains per day.

In addition to the proposed intermediate stations, a regional station was investigated to be located in the vicinity of where the rail line crosses I-495 just north of the existing I-90/I-495 interchange. In consideration of the environmental concerns, high cost of constructing access and long lead time for design and environmental permitting, a regional station is not currently proposed as part of this project.

Commuter rail ridership is expected to be drawn primarily from 28 communities in the Boston Metrowest and Greater Worcester areas (see Section 2.2).



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 6 Miles

0 6

PROJECT CORRIDOR

FIGURE 1.1-2

1.2 History of Public Transportation in Study Corridor

Rail Passenger Service

The Boston & Worcester Railroad was one of the first three railroads built in Massachusetts, and was also one of the earliest in the United States. The first section of it opened between Boston and West Newton on April 16, 1834. The remainder opened in several stages over the next year, with service through to Worcester beginning on July 4, 1835. Like most railroads in the era, it was built primarily for freight service, with passenger service provided only as an extra source of revenue. In those days, most people lived within walking distance of their jobs and work trips of over ten miles were unusual. Early schedules provided three round trips per day between Boston and Worcester, one in the morning, one at mid-day, and one in the late afternoon. Boston arrival and departure times would not have been suitable for most people's work schedules even if they had wanted to travel that far.

Travel time improvements provided by railroads facilitated work trips from longer distances than before, but the impact on residential development was greatest within 10 to 15 miles of Boston. As demand grew, the railroads added service convenient for work travel from increasing distances and promoted ridership by selling multiple-ride tickets at substantial discounts. (The word "commuter" originally referred to passengers that used multiple-ride tickets that were sold at reduced or "commuted" rates.) Boston work travel on the Boston & Worcester Railroad was feasible from as far west as Natick starting in 1846, but service to Worcester did not provide both an arrival in Boston before 9:00 a.m. and a departure after 5:00 p.m. until the early 1860's.

From the time it opened, the Boston & Worcester Railroad had intermediate stations between Framingham and Worcester at Ashland, Southville (Southborough), Westborough, and North Grafton. A fifth station, Millbury Junction, opened in 1837. It served mainly as a transfer point between Main Line trains and a three-mile branch to downtown Millbury that opened at the same time. A sixth station, Cordaville in Southborough, opened about 1856. It was less than a mile from the Southville station, but more centrally located. Nevertheless, Southville was also retained as a station. After this, although there were some slight relocations of stations and improvements to facilities, no additional passenger stations were built between Framingham and Worcester.

When trains with schedules suitable for work trips from Worcester to Boston were first established, they did not serve the other stations west of Framingham except

Westborough. Service to the other intermediate stops was added gradually, with all stations having Boston commuting possible as of about 1900.

The Boston & Worcester Railroad merged in 1867 with the Western Railroad to form the Boston & Albany Railroad. (The Western had opened from Worcester to Springfield in 1839 and to the Hudson River opposite Albany in 1841). The B&A was leased in 1900 to the New York Central System.

Peak of Service and Beginning of Decline

As on most routes, the all-time passenger-service peak on the Boston and Albany line occurred in the early 1900's. In 1912, Boston-Worcester weekday service included seven inbound and six outbound trips a day that terminated at Worcester. There were also eight inbound and six outbound trains between Springfield and Boston, one round trip between Pittsfield and Boston, and six intercity trains between Boston and Albany or points west, making a total of 28 inbound and 25 outbound trips a day between Worcester and Boston. Worcester itself was the only station west of Framingham served by all of these trains. Most trains originating west of Worcester did not serve intermediate stops between Worcester and Framingham, and not all of the Worcester turnbacks served all of these stations either.

To accommodate all of the trains on the Boston & Albany Main Line and other rail routes serving Worcester, a new Union Station at Washington Square was completed in 1911. It replaced the first Worcester Union Station, which had opened in 1876.

The Massachusetts rail passenger system as a whole began declining around World War I, as the result of many factors including dramatic growth in automobile ownership, improved roads, and greatly increased operating expenses. Routes such as Boston-Worcester that carried higher proportions of non-work trips generally held up better than those with predominantly short commuter trips. As late as 1940, Worcester was still served by 22 round trips a day to Boston, including six inbounds and seven outbounds terminating at Worcester, but ridership fell steadily after World War II.

The opening of the Massachusetts Turnpike from Route 128 to the New York State Line in 1957 was blamed for substantial ridership losses on the parallel Boston & Albany rail line. In 1959, service west of Framingham was cut back to three inbound and two outbound Worcester trains, four inbound and five outbound Springfield trains, two inbound and three outbound Albany trains, and one Chicago round trip. This left a total of ten inbound and 11 outbound trips a day between Worcester and Boston.

In April 1960, service was reduced further, to a single Worcester round trip, two inbound and one outbound Springfield trips, and the Albany and Chicago trains. This left Worcester with six round trips a day. The number of Boston-Framingham short-turns was reduced from nine inbound and 11 outbound to two each way. All of the remaining intermediate stops between Framingham and Worcester (Ashland, Cordaville, Southville, Westborough and North Grafton) were discontinued. At the time, the communities in this corridor had relatively low Boston work-trip orientation. According to 1963 survey data, there were a total of 98 daily work trips to Boston from Ashland, none from Southborough, and 17 from Westborough by all modes.

The Massachusetts Department of Public Utilities had initially granted the New York Central permission to discontinue all intrastate passenger service on the Boston & Albany line in 1960, but modified the decision after public protests. Nevertheless, between 1961 and 1964, all of the Boston-Springfield trains and all but one of the Albany round trips were either discontinued or cut back to Boston-Worcester runs. This left Worcester with two inbound and three outbound trips based there, plus one round trip each from Chicago and Albany, for a total of four inbound and five outbound trains a day.

Beginning of Commuter Rail Subsidies

During the same time that service was being curtailed on the New York Central's Boston & Albany line, Boston's other two passenger railroads, the Boston & Maine and the New Haven, also were experiencing major ridership losses and making drastic service cutbacks. To determine whether commuter rail service could or should be saved, the Massachusetts legislature created a temporary Massachusetts Transportation Commission (MTC) to study the problem. During 1963 and 1964, the MTC conducted various fare and service experiments on B&M and New Haven system routes, but New York Central management declined to participate. The findings of the MTC resulted in the creation of the MBTA in 1964, partly as a means of maintaining commuter rail service while developing long-range plans.

The MBTA began subsidizing commuter service on the B&M in 1965 and on the New Haven in 1966. Management of the New York Central was still unwilling to accept a subsidy on terms agreeable to the MBTA, and continued to seek permission to end all passenger service. In March 1968, the New York Central was merged into the Penn Central system, which also absorbed the New Haven in December of that year. In 1969, Penn Central reduced Worcester-Boston passenger service to a single weekday commuter trip plus the Boston-Chicago round trip. Prior to this cutback, 40 to 45 inbound passengers a day were still boarding the commuter trains at Worcester.

Penn Central declared bankruptcy in June 1970. To relieve this company and other railroads of large losses from passenger service, Congress created Amtrak to take over intercity service nationwide. The original Amtrak network did not include Boston-Chicago service, so the last train between Boston and Albany was discontinued effective May 1, 1971, when Amtrak began operating. This left Worcester briefly with only the single round-trip commuter train. Two weeks later, Amtrak began running one round trip a day between Boston and New Haven via Worcester and Springfield. The schedule of this train changed many times, but it was never very successful. Partial funding was to have been provided by the Commonwealth of Massachusetts, but because of a dispute over terms of the contract, the train was discontinued in March 1975.

In 1973, the MBTA began subsidizing operation of Penn Central's two remaining Boston-Framingham round trips. The portion of the Worcester round trip from Framingham east was also included in the agreement, but no funding was available for service to Worcester itself, which was outside the MBTA district. By 1975, boarding at Worcester had declined to an average of only 15 passengers per day. On October 27, 1975, the single Worcester round trip was cut back to Framingham. Worcester was entirely without rail passenger service for only a few days, as Amtrak reinstated Boston-Chicago service via Worcester on October 31, 1975. This service has never been suitable for one-day trips between Worcester and Boston, as the eastbound arrival and westbound departure at Boston both occur in the afternoon. Since October 1984, Amtrak has run one or two trains each way per day between Boston and New Haven via Worcester in addition to the Chicago trains. Schedules and fares on these trains have not been conducive to repetitive travel, however.

Worcester commuter trains used the platform at the Worcester Union Station until the end of service in 1975. Amtrak built a small waiting room, ticket office, and parking lot a short distance east and relocated there soon after Boston-Chicago service resumed.

In April 1976, freight service on most Penn Central lines in Massachusetts was taken over by the Consolidated Rail Corporation (Conrail). Operation of commuter service between Boston and Framingham as well as MBTA contract service on other former Penn Central lines was also taken over by Conrail. This included all routes running to and from South Station. Under terms of the federal legislation that established Conrail, the subsidy cost for this commuter service would have increased greatly after one year. The MBTA had previously purchased the rights of way and equipment used in South Side commuter service and was therefore able to solicit competitive bids from other potential operators. In March 1977, a contract for operating the South Side lines was awarded to the Boston & Maine Corporation, which had operated North Side lines for the MBTA since 1965. The B&M continued as the operator until

the end of 1986. Since January 1, 1987, Amtrak has been the contract operator of all Boston commuter rail service in addition to its own intercity service.

Subsidies of Commuter Rail Service Outside the MBTA District

Under the legislation that created the MBTA, and subsequent amendments, the Authority cannot operate service outside the district unless operating losses are reimbursed by some other entity. With the exception of Ashland all communities on a Worcester extension would be outside the MBTA District, but there is substantial precedent for this. All present MBTA commuter rail routes except for the Framingham, Needham and Fairmount lines include at least one station outside the District, as will two of the three proposed Old Colony lines. When the MBTA initially began subsidizing commuter rail service, segments beyond the district were funded by contracts with the cities and towns in which the stations were located. For the first several years, special annual appropriations by the legislature reimbursed the communities for all or most of these costs. Starting in 1974, the state share of funding of service outside the district dropped to 50 percent. This, combined with rising operating costs and changes in the formulas used to calculate the losses from out-of-district segments, drove up the contract costs to the extent that several communities chose to discontinue service.

Beginning in 1979, most outside service was funded through Regional Transit Authorities rather than by individual cities and towns. At present, only the town of Franklin still contracts directly with the MBTA for commuter rail service. RTA funding resulted in restoration of service to several points where it had previously been discontinued. The Worcester Regional Transit Authority could have arranged for service under such an agreement as well, but for many years chose to spend its funds on local bus service.

Bus Service

Origins

Operation of modern express bus service to Boston from the Worcester corridor was made possible by the construction of the Massachusetts Turnpike, which at the same time contributed to the demise of commuter rail service. The Turnpike opened in May 1957, from the end of the New York State Thruway at Stockbridge to Route 128 in Weston. It was always intended that the Turnpike run directly to Boston, but problems in acquiring a route delayed completion for several years. The Turnpike extension was finally built along the right-of-way of the Boston & Albany Railroad line, now the MBTA's Framingham commuter rail line, which was reduced from four tracks to two. Nevertheless, massive additional land-taking and building demolition

was required. The extension opened from Route 128 to Allston in September 1964, and to South Station in February 1965.

Between 1957 and 1964, the fastest route to Boston for traffic reaching the end of the original Turnpike was to take Route 128 to Route 9. Prior to construction of the original Turnpike, the main east-west highway route across the state was U.S. Route 20 between the New York border and Northborough, and then either Route 9 or Route 20 to Boston. Intercity bus service on these highways was provided from the early days of the industry in the 1920s and 1930s, but was not time-competitive with trains.

One of the first companies to operate bus service between Worcester and Boston was the Boston and Worcester Street Railway (B&W St. Ry.), which started a route mostly via Route 20 in 1924. This line lasted for over 50 years under various operators, but most of the passengers that used it did not travel all the way through.

The B&W St. Ry. had run a trolley between Boston and Worcester since 1903. That route followed Route 9 between Boston and Framingham Center, but was largely on private right-of-way west of there. The B&W was reorganized in 1927 as the Boston, Worcester, and New York Street Railway. This company replaced trolley service west of Framingham Center with bus service on the newly-constructed Route 9 in 1931. The remainder of the line was replaced with buses on Route 9 in 1932. In the late 1940s, the same company tried running "non-stop" deluxe bus service between Worcester and Boston on Route 9, but it apparently did not last long. This service was non-stop in the sense that there were no intermediate passenger stops, but buses would have had to stop for many traffic lights along the way.

Express Bus Service

The Boston, Worcester & New York Street Railway Company was succeeded in 1963 by the Boston-Worcester Corporation, which conducted business as B&W Lines. This company began making use of the Turnpike soon after the Boston extension was completed. In April 1965, B&W inaugurated semi-express service from Worcester to Boston. Buses used the old local route alignment via Route 9 from Worcester to Speen Street in Natick and then ran on the Pike to Copley Square, continuing on local streets to the Trailways terminal in Park Square. This was the first modern-day express bus service from Worcester to Boston.

In 1971, B&W Lines sold all of its business to The Gray Line. The latter had previously been mostly a tour bus operator but was trying to diversify into fixed-route service. Gray Line began operating non-stop Worcester-Boston express service around January 1972. There were only two or three trips each way, all in commuting hours.

Schedules indicate the routing as I-290, I-495 and the Turnpike. This service did not last long. At about the same time, Gray Line established a Shopper's World-Boston short-turn express service via the Turnpike in addition to service continuing through to Worcester via Route 9. Some of the Shopper's World trips originated at the Waterview (now Edgewater) apartment complex on Route 9 in western Framingham.

Gray Line found the former B&W system to be unprofitable, and began selling off routes to other carriers. In 1974, service between Framingham and Boston on Route 9 was sold to the Wellesley Fells Bus Line. Gray Line retained the semi-express route from Worcester to Boston via Route 9 and the Turnpike,. and the Edgewater/Shopper's World Express. Through service from Worcester to Boston on Route 9 was discontinued. About the same time, Gray Line began running a few Worcester trips on the Turnpike from Exit 12 in Framingham instead of Speen Street, speeding up service to Worcester, Westborough and Southborough.

In December 1978, Gray Line also sold the Edgewater/Shopper's World Express to Wellesley Fells, but retained the Worcester routes. Wellesley Fells went out of business abruptly in the summer of 1979. A new Gray Line subsidiary called Gray Line Framingham Commuter Corp. then took over the Edgewater/Shopper's World route. A new company, Suburban Lines, took over the Framingham-Boston local service on Route 9.

In 1981, Gray Line eliminated all intermediate shops between Worcester and Boston except Shopper's World, and began running via Route 122 and the Turnpike instead of Route 9 west of Shopper's World. At the same time, Suburban Lines extended their Framingham-Boston local route through to Worcester on Route 9. Intermediate points between Edgewater and Worcester then had only local bus service to Boston for the first time since 1965.

In 1984, Suburban Lines went out of business and was succeeded as operator of Worcester-Boston local service by Marathon Lines, formerly an affiliated charter bus company. The same year, Peter Pan Bus Lines began operating Worcester-Boston express bus service, in competition with Gray Line. Peter Pan had been operating bus service between Springfield and Boston since 1933. This service initially ran via old state highways. Over the years, the company acquired operating rights to several route variations, including use of the Turnpike as soon as it opened. Some of Peter Pan's Springfield buses made intermediate stops in Worcester, but the Department of Public Utilities had a long-standing policy of protecting the oldest carrier in any market. The original bus service of the Boston, Worcester & New York Street Railway, to which The Gray Line had become successor, slightly pre-dated Peter Pan's service thorough Worcester. Therefore, Peter Pan operating rights stipulated that no passenger could be carried whose entire trip was between Worcester and Boston.

The rules changed with the passage by Congress of the Bus Regulatory Reform Act of 1982. This act gave the Interstate Commerce Commission broad new powers to overrule state regulatory agencies in order to further national transportation goals of efficiency and energy conservation. This power was used in the next few years to strike out service restrictions in many bus operating certificates. Peter Pan successfully appealed the restriction against carrying Worcester-Boston passengers, and inaugurated service in June 1984. Gray Line soon lost so much of the business that it withdrew from the corridor.

The number of trips per day operated by Peter Pan on the Worcester-Boston route has changed little since it began in 1984, but more of the inbound arrivals are now scheduled in the A.M. peak, and more trips are operated separately from Springfield service. Initially eight round trips per day served the Auburn Mall in addition to downtown Worcester. This was gradually reduced to the present two round trips a day. Most of the Worcester express buses also originally stopped at Speen Street in Natick, but that was dropped after a short time. The stop at the Millbury Park-and-Ride lot has been included since that facility opened about 1990. The express buses already ran past the site anyway.

In the fall of 1984, Gray Line also gave up the Edgewater/Shopper's World express service, selling it to Priority Express, a new company affiliated with Marathon. Peter Pan bought out this service in the summer of 1988, but had to take Marathon's local Route 9 Worcester-Boston service as part of the deal. Peter Pan announced plans to abandon the Route 9 service later that year, but it was saved by a subsidy from the MBTA Inter-District Transportation Service program. Peter Pan has continued to run the express routes without subsidies.

From about 1988 to 1990, some trips on Peter Pan's Worcester-Boston express route stopped at the Marriott Hotel in Westborough, but schedules suitable for Boston commuting were not included. From 1990 to 1992, some trips on the Edgewater/Shopper's World Express route were extended to the Westborough Marriott. These trips ran at times suitable for Boston commuting, but were unsuccessful. Westborough has had no express bus service to Boston since 1992.

1.3 Existing Transportation Services in the Study Corridor

This section describes the existing transportation systems and services in the project study area. The primary mode of travel is via the existing highway network, which is increasingly congested, particularly during the peak commuting hours. Although there are options other than travel by private automobile, most of them are still dependent on travel by highway.

For trips between Worcester and Boston, the principal highway connection is the Massachusetts Turnpike. Opened to traffic in 1957, this limited access toll road supplemented the historical east-west highways between the two cities—U.S. Route 20 and State Route 9.

Regional Highway System

The classification of highways into different operational systems, functional classes or geometric types is necessary for communication among engineers, administrators and the general public. Comprehensive transportation planning uses functional classification as the method of grouping highways. Roadways serve two basic purposes—to provide access to property, and to provide mobility. The functional classification system stratifies highways generally by decreasing levels of mobility. Thus limited access is the highest class of roadway, followed by arterials, collectors and local access roads. Limited access highways include the Interstate System and other major divided highways with access control. They provide high speed travel for significant volumes of traffic over long distances, and generally connect major population centers. Arterials also typically interconnect cities and towns and carry substantial traffic; however, since they also often provide access to abutting property, there is less mobility. The collector roads distribute arterial traffic into the neighborhood's local streets. To some extent, the difference between collectors and local streets is minor; collectors often are essentially local streets designated as collector roadways based on continuity, traffic volumes, and connections to arterial roadways.

The roadway system in the project area includes the full range of highway classifications:

- Limited access highways, principally the interstate routes;
- arterials, typically U.S. and State numbered routes;
- collectors roadways; and
- local streets.

Limited Access Highways

In the Worcester study area, there are six limited access highways. Shown on Figure 1.3-1 and described below, all but one are part of the Interstate Highway System.

1. Route I-90 (Massachusetts Turnpike) is the most important east-west highway in Massachusetts, extending 134 miles from Boston to the New York State line. The Turnpike is a toll road constructed and operated by the Massachusetts Turnpike Authority. Between Worcester and Boston, the roadway provides three travel lanes in each direction, with the exception of a four-lane segment between Newton Corner and Allston.

2. Route I-495 is Boston's outer circumferential highway and runs through the project area in a generally north-south direction. This six lane highway, three lanes in each direction, crosses the Turnpike and the rail line at the same location in Westborough.

3. Route I-290 is a six lane highway that extends from the Turnpike Exit 10 at Auburn northerly through the City of Worcester, then easterly to Route I-495 in Marlborough.

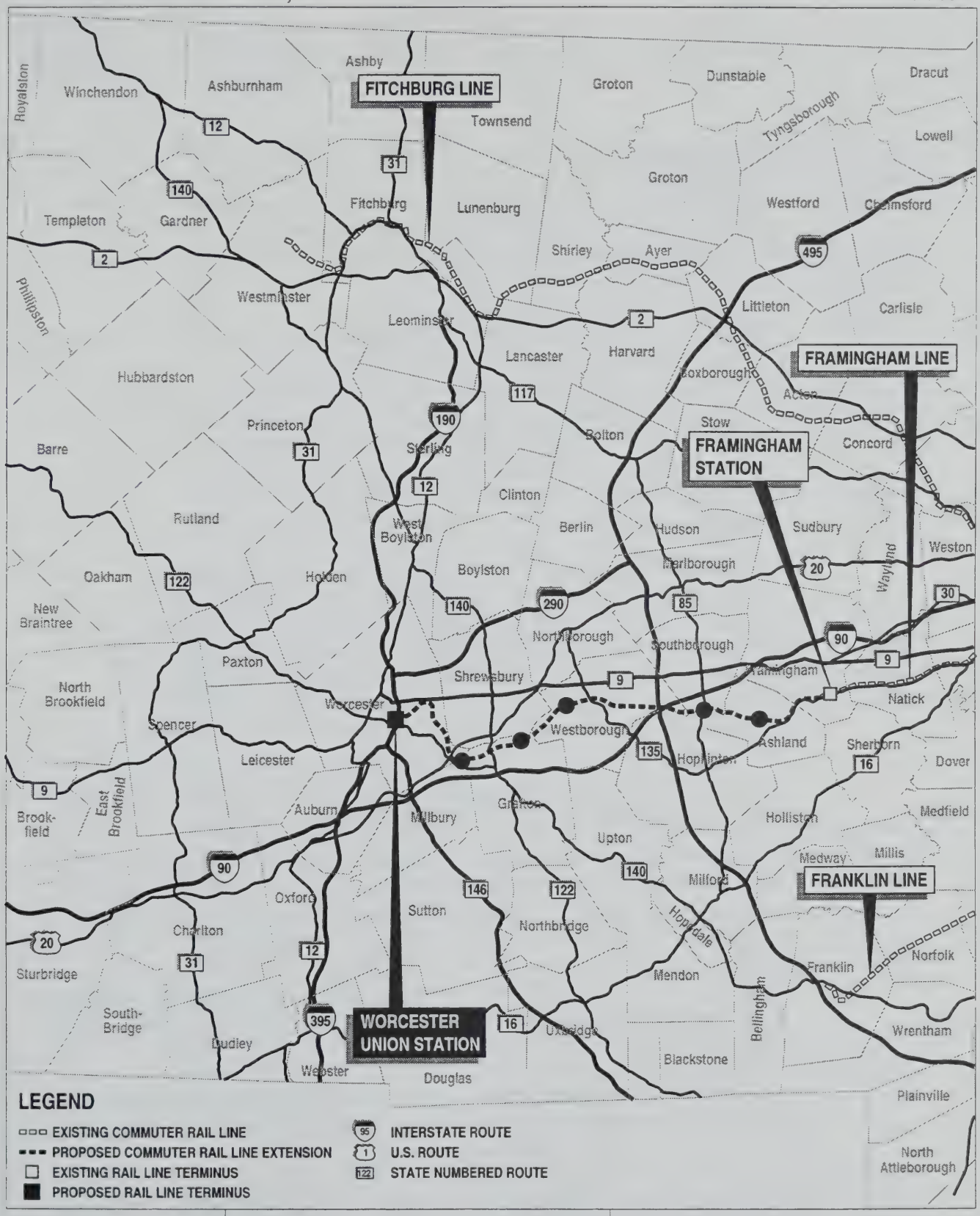
4. Route I-190 is a four lane highway that extends north from I-290 in Worcester to Route 2 and the Leominster/Fitchburg area.

5. Route I-395 is a four lane highway that runs south from I-90 at exit 10 (Auburn) to the Norwich, Connecticut area.

6. Route 146 is a four lane state highway connecting Worcester and Providence, Rhode Island. It is not part of the Interstate Highway System.

Arterial Roadways

Arterial roadways are important routes for distribution of traffic to and from the limited access highways. They typically are the numbered U.S. and state routes, although in urban areas, arterials frequently include roadways without route numbers. Arterials carry substantial volumes of traffic and provide inter-community connections. Since they often fulfill the role of providing access to property, the mobility is of lesser quality than that of limited access highways. Arterials discussed here can be further categorized as divided and undivided facilities.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 6 Miles

0 6

REGIONAL HIGHWAY SYSTEM

FIGURE 1.3-1

Major Divided Arterials

Major divided state arterials have two or more lanes in each direction with a median barrier or separation between the opposing travel lanes. Turns to and from adjacent land uses are common, and it is this feature that distinguishes this roadway type from limited access highways discussed above.

Route 9 is the dominant east-west arterial in the corridor between Worcester and Boston. This four lane divided highway interchanges with the Massachusetts Turnpike in Framingham. While there are a number of grade separated interchanges on Route 9, most intersections are at grade, controlled by traffic signals. Congestion and delays during peak travel periods are common. Route 9 has the historical significance of being one of the first divided highways in the country.

Undivided Arterials

Several undivided state or U.S. numbered routes serve the project area. While they typically provide only two travel lanes, there may be localized improvements with four or more lanes. These roads serve as the major roadways between cities and towns, and connect to the larger highways discussed above. Some sections of these numbered routes are, in fact, locally owned and maintained roadways.

US Route 20 is an east-west highway connecting Worcester and Boston. Although long distance travel along Route 20 is possible, this two lane, undivided highway is primarily utilized for shorter trips and for local access. Most of the intersections along its length are at-grade with the major intersections being controlled by traffic signals.

State Route 12 runs north from the Connecticut State Line in Dudley through the center of Worcester to the New Hampshire State Line in Winchendon. Since this route closely parallels I-395/I-290/I-190, it is not a primary choice for long distance travel.

State Route 16 runs northeasterly from the Connecticut State Line in Dudley to downtown Boston. The Route 16 corridor is generally along the southern limits of the study area.

State Route 30 runs east from Route 140 in North Grafton to downtown Boston. It is a primary route for some of the residents of Grafton and Westborough to access Route 9 and the Massachusetts Turnpike eastbound.

State Route 31 runs north from the Connecticut state line in Dudley through the western portion of the Worcester area to the New Hampshire State Line in Ashby.

State Route 85 runs north from Route 16 in Milford to Route 117 in Bolton. It is a primary access route via Route 9 for the residents of Hopkinton, Southborough, Marlborough, and Hudson to access the Turnpike eastbound.

State Route 122 runs northwest from the Rhode Island State Line in Blackstone through the center of Worcester to Route 2A in Orange. Route 122 serves as a primary route for the residents of Northbridge, Millbury, and parts of Worcester to access the Turnpike eastbound.

State Route 140 runs northwest from New Bedford through the Worcester area to Winchendon. It is a primary route via Route 9 for the residents of Boylston, Shrewsbury and Grafton to access the Turnpike.

State Route 135 connects Northborough with Hopkinton through the center of Westborough and has an interchange with Route 9 in Westborough.

Collector Streets and Local Streets

Collector streets generally serve to distribute arterial traffic to the local streets. Local streets are roadways whose function is to serve the adjacent land use. The collector and local streets that play a role or may be affected by the proposed project are discussed in the local traffic section of the impact chapters for each proposed station site.

Existing Operations - Level of Service

Level of Service (LOS) is a rating system used to describe how efficiently a section of road or intersection is functioning. Intersections and highway segments do not have infinite capacity; when the volume of traffic approaches capacity, delays and congestion occur. Vehicle delays result in increased emissions of air contaminants and consequently, diminished air quality. Further, cumulative effects of lost time due to delays and congestion have also been cited in various studies as having a significant economic impact.

Level of Service is usually measured during the A.M. or P.M. peak travel periods when traffic volumes are highest. The Level of Service rating system and procedures were developed by the Institute of Transportation Engineers and are described in the 1985 Highway Capacity Manual published by the Transportation Research Board.

There are different LOS analysis procedures for different types of roadways and intersections. The level of service criteria for a two lane highway are different from those for a freeway and the LOS criteria for a signalized intersection are different from those for an unsignalized intersection. All types of intersections and roadways,

however, use the same rating designation of "A" to "F" where A is "best" and F is "worst". In general terms, the ratings can be described as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Extreme delays

When quantifying the LOS of a signalized intersection, the rating is based on the seconds of delay for vehicles approaching the intersection. Unsignalized intersections are rated on a reserve capacity system expressed as passenger cars per hour. The LOS of a two lane highway relates to the percentage of time drivers are delayed. Although all of the LOS quantifications relate in some manner to delay, it is not possible directly to equate similar ratings for different types of roadways or intersections.

Congestion on the Massachusetts Turnpike, the most important east-west highway in the state, is of prime concern because delays and congestion contribute to air pollution as well as lessen the competitive economic position of the region. The section of the Massachusetts Turnpike in the study corridor currently is operating at a good level of service with relatively high travel speeds and minimal delays. The sections of Massachusetts Turnpike closer to Boston, however, do suffer from congestion during the peak travel hours.

A recent Massachusetts Turnpike Authority study indicates that by 1995, without remedial action, 82% of the length of turnpike eastbound between Route I-95 in Weston and Route I-93 in Boston will operate at LOS F during the A.M. peak hour. Similar operating levels will occur westbound in the afternoon peak.

The level of service on roads in the MetroWest area was studied in a 1984 Metropolitan Area Planning Council report entitled *"Metrowest Growth Impacts Study."* In that report, the traffic conditions were summarized as follows: "The transportation analysis, performed by the Central Transportation Planning Staff (CTPS), indicates that the current conditions on Routes 9 and 30 are poor. Conditions on the region's other major routes, such as Routes 135, 126 and 27 are also poor. With the exception of Route I-90 (Massachusetts Turnpike), current levels of service throughout the region are at level E/F or worse. Conditions on Metrowest's arterial roadways, during peak hours, are worse than level E."

Regional Bus Service

All existing bus service between locations in the Worcester area and downtown Boston is provided by private, for-profit companies. Current operators are Peter Pan Bus Lines, Inc., Greyhound Lines, Inc., Gulbankian Bus Lines, and Cavalier Coach Corporation.

The bus companies generally are free to expand their service to meet demand and essentially have done so consistent with their own business objectives. There is regulation of bus routes by the State and once service is established it must be maintained until permission for modification or reduction is obtained from the Department of Public Utilities.

It is expected that if demand increases, the bus companies would increase the number of scheduled runs. Private bus ridership figures are not available as they are not public information. Total private bus commuter ridership in the study area is estimated to be between 500 and 600 people a day.

Peter Pan

Peter Pan Bus Lines, Inc. provides several types of service including an express bus service to Boston via the Massachusetts Turnpike, local service to Boston via Route 9, a combination Worcester to Framingham local then express to Boston via the Massachusetts Turnpike, and a Worcester to Logan Airport Express.

The Worcester to Boston Express Service runs throughout the day with six buses operating in the A.M. peak period on approximately half hour headways. The buses leave the Peter Pan terminal in Worcester on Southbridge Street and pickup additional passengers at the Douglas Drug Park and Ride lot on Route 122 in Worcester and the Turnpike Exit 11 Park and Ride lot in Millbury. Both park and ride lots are run by the Massachusetts Turnpike Authority. The peak period buses run express via the Massachusetts Turnpike and stop at Copley Square, Park Square, and the Peter Pan terminal near South Station. Travel time is approximately one hour and ten minutes from the Worcester terminal to the Boston terminal. The complete schedule for the Worcester Express buses is shown on the following page. Basic one-way fare is $7.50; however, multiple ride ticket books can be purchased that reduce the per-ride cost.

Peter Pan does not have parking facilities at its Worcester terminal but parking is available at an adjacent private lot for $3.00 a day. Parking at the Douglas Drug lot and the Exit 11 park and ride lot is available free of charge.

Peter Pan also operates a local service route between Worcester and Boston via Route 9 and a route that runs express from Shoppers World after making a few stops along Route 9. Both schedules are included on the following page. The local service along Route 9 is subsidized by the Inter-District Transportation Service program.

Greyhound Lines, Inc.

Greyhound is a national bus company that concentrates on intercity travel and is not a major provider of service to the commuter market between Worcester and Boston.

The service that Greyhound does provide is an express run between Worcester and Boston's South Station with an intermediate stop at the MBTA Riverside station in Newton. A schedule, including fares for the Greyhound service is included below. At the present time, Greyhound runs only one A.M. peak period bus to Boston and only one P.M. peak period bus returns to Worcester.

Gulbankian Bus Lines

Gulbankian Bus Lines, located in Southborough, provides commuter service between Hudson, Marlborough and Southborough to Boston. Gulbankian currently runs two peak hour buses along Route 85 in Hudson, Marlborough and Southborough to Park Square, Boston. One of the current peak period runs is a 180 day trial operation. Mr. Michael Gulbankian, owner of the company, reports that the two buses appear to be well used and that he will seek state approval of the second peak period run on a permanent basis. Gulbankian provides free parking at the Cherry Street terminal located south of Route 9 in Southborough. Gulbankian also runs two P.M. peak period buses from Boston.

Cavalier Coach Corporation

Cavalier currently operates one A.M. bus, originating at Route 135/Route 20 in Northborough and terminating in downtown Boston. The bus departs from Northborough at 6:45 A.M., with stops in Marlborough, Sudbury, Wayland, and Weston. Discharge points in Boston include Copley Square, Park Square, Tufts/New England Medical Center, South Station, and Government Center. A return trip in the afternoon leaves Government Center at 5:05 P.M. and South Station at 5:20 P.M. This service also is subsidized under the Inter-District Transportation Service program.

WORCESTER—BOSTON EXPRESS

READ DOWN

SCHEDULE NUMBER	300	316	302	304	304	104	404	314	314	108	318	312	452	452	306	116	454	122	122	458	128	130	132	134
Folder No. 7044 A 3-25-94																								
FREQUENCY			X67H	X67H	67H			X67H	67H		67H	X67H	X67H	67H				X67H	67H					
Auburn, MA (M.T.# 10 Park & Ride) . PPB Lv			6 40	7 05	7 05																			
WORCESTER, MA Lv	6 15	6 40	7 00	7 25	7 25	7 45	8 15	9 15	9 15	10 30	11 00	11 30	12 45	12 45	1 30	2 15	3 40	5 40	5 40	6 30	8 15	10 30	12 30	3 30
Worcester (Douglas Drug Park & Ride) . . . Lv	6 23	6 47	7 10	7 35	7 35	7 55	8 25	9 25	9 25	10 40	11 10	11 40	12 55	12 55	1 40	2 25	3 50	5 50	5 50	6 40				
Millbury (M.T.# 11 Commuter Lot)	6 25	6 50	7 12	7 37	7 37	7 57	8 27	9 27	9 27	10 42	11 12	11 42	12 57	12 57	1 42	2 27	3 52	5 52	5 52	6 42				
Framingham Center					7 55				9 45					1 20					6 15			11 05	1 05	
Shopper's World (Peter Pan Booth-Rte. 30) .					8 00				9 50					1 25			4 25		6 20	7 15		11 10	1 10	
Newton (MBTA Riverside) . . . . . Ar																					9 00	11 15	1 20	4 15
BOSTON, MA (Copley Sq.) . . . . . Ar	7 05	7 30	8 00	8 25	8 35	8 45																	1 30	4 25
BOSTON, MA (Park Sq.)	7 10	7 35	8 05	8 30	8 40	8 50																	1 35	4 30
BOSTON, MA (Peter Pan Term.) . . PPB Ar	7 15	7 45	8 10	8 35	8 45	8 55	9 15	10 15	10 25	11 30	12 00	12 30	1 45	1 55	2 30	3 15	4 45	8 40	8 50	7 35	9 20	11 35	1 40	4 35

7044A-0311ms 7044B-0308gt

BOSTON—WORCESTER EXPRESS

READ DOWN

SCHEDULE NUMBER	101	103	105	451	307	111	321	117	309	301	317	303	125	469	131	323	135
Folder No. 7044 B 3-25-94																	
FREQUENCY					X67H												
BOSTON, MA (Peter Pan Term.) . . . . PPB Lv	3 40	5 40	8 00	9 00	10 00	11 00	12 15	2 00	3 00	4 30	5 05	5 25	6 15	7 45	9 15	10 15	12 15
Boston Park Sq.-St. James & Arlington Lv		5 42			10 05												
Boston (Copley Sq.)		5 45			10 10												
Newton (MBTA Riverside) Lv	4 00	6 00															12 35
Shopper's World (Peter Pan Booth-Rte. 30) .				9 25	10 30		12 40		3 25						9 40	10 40	
Framingham Center															9 45		
Millbury (M.T.# 11 Commuter Lot)			8 50	9 50		11 45		2 50	4 05	5 15	5 50	6 10	7 00	8 30	10 00		
Worcester (Douglas Drug Park & Ride) . . . Ar	4 30	6 30	8 55	9 55		11 50		2 55	4 10	5 20	5 55	6 15	7 05	8 35	10 05		
WORCESTER, MA . . . . . Ar	4 40	6 40	9 05	10 05	11 20	12 01	1 20	3 05	4 20	5 30	6 05	6 25	7 15	8 45	10 15	11 25	1 20
Auburn, MA (M.T.# 10 Park & Ride) PPB Ar										5 35		6 30					

7044C-0307dh 7044D-0308dk

WORCESTER TO BOSTON - LOCAL SERVICE VIA ROUTE 9

SERVICE OPERATES MONDAY THRU FRIDAY EXCEPT HOLIDAYS

READ DOWN / READ UP

54	52	50	46	44	42	40	SCHEDULE NUMBER	41	43	47	51	53	55	57
X67H	X67H	X67H	X67H	X67H	X67H	X67H	Folder No. 7032 3-25-94 FREQUENCY	X67H	X67H	X67H	X67H	X67H	X67H	X67H
5 00	3 00	1 00	11 00	9 00	7 00	5 00 Lv	WORCESTER, MA . . . . . PPB Ar	8 40	10 40	12 40	2 40	4 40	7 10	8 40
5 05	3 05	1 05	11 05	9 05	7 05	5 05	Fairlawn	8 25	10 25	12 25	2 25	4 25	6 55	8 25
5 10	3 10	1 10	11 10	9 10	7 10	5 10	South Street	8 20	10 20	12 20	2 20	4 20	6 50	8 20
5 13	3 13	1 13	11 13	9 13	7 13	5 13	Levitz's	8 13	10 13	12 13	2 13	4 13	6 43	8 13
5 14	3 15	1 15	11 15	9 15	7 15	5 15	Lyman Street	8 10	10 10	12 10	2 10	4 10	6 40	8 10
↓	↓	↓	↓	↓	7 18	↓	Westboro (Marriott)	↓	↓	↓	↓	4 08	↓	↓
5 20	3 20	1 20	11 20	9 20	7 20	5 20	White's Corner	8 05	10 05	12 05	2 05	4 05	6 35	8 05
5 23	3 23	1 23	11 23	9 23	7 23	5 23	Fayville	8 03	10 03	12 03	2 03	4 03	6 33	8 03
5 30	3 30	1 30	11 30	9 30	7 30	5 30	Edgewater	8 00	10 00	12 00	2 00	4 00	6 30	8 00
5 32	3 32	1 32	11 32	9 32	7 32	5 32	Temple Street	7 58	9 58	11 58	1 58	3 58	6 28	7 58
5 35	3 35	1 35	11 35	9 35	7 35	5 35	Framingham Center	7 55	9 55	11 55	1 55	3 55	6 25	7 55
5 37	3 37	1 37	11 37	9 37	7 37	5 37	Georgetown/Granada	7 53	9 53	11 53	1 53	3 53	6 23	7 53
5 40	3 40	1 40	11 40	9 40	7 40	5 40	Shopper's World (Bus Shelter/Rt. 9) . . .	7 50	9 50	11 50	1 50	3 50	6 20	7 50
5 45	3 45	1 45	11 45	9 45	7 45	5 45	Route 9 & 27, MA	7 45	9 45	11 45	1 45	3 45	6 15	7 45
5 50	3 50	1 50	11 50	9 50	7 50	5 50	Oak Street	7 40	9 40	11 40	1 40	3 40	6 10	7 40
6 00	4 00	2 00	12 00	10 00	8 00	6 00	Wellesley Hills	7 35	9 35	11 35	1 35	3 35	6 05	7 35
6 05	4 05	2 05	12 05	10 05	8 05	6 05	Newton Highlands	7 25	9 25	11 25	1 25	3 25	5 55	7 25
6 10	4 10	2 10	12 10	10 10	8 10	6 10	Chestnut Hill	7 20	9 20	11 20	1 20	3 20	5 50	7 20
6 15	4 15	2 15	12 15	10 15	8 15	6 15	Brookline	7 16	9 16	11 16	1 16	3 16	5 46	7 16
6 18	4 18	2 18	12 18	10 18	8 18	6 18	Brigham Center	7 13	9 13	11 13	1 13	3 13	5 43	7 13
6 25	4 25	2 25	12 25	10 25	8 25	6 25 Ar	BOSTON (Copley Square) Lv	7 08	9 08	11 08	1 08	3 08	5 38	7 08
6 30	4 30	2 30	12 30	10 30	8 30	6 30 Ar	BOSTON (Park Square) Lv	7 05	9 05	11 05	1 05	3 05	5 35	7 05
6 40	4 40	2 40	12 40	10 40	8 40	6 40 Ar	BOSTON, MA (Peter Pan Term.) . . PPB Lv	7 00	9 00	11 00	1 00	3 00	5 30	7 00

7032-0216dh

This service in part is subsidized by the M.B.T.A.

Peter Pan

Offers DISCOUNTS Up To 25% On Commuter Tickets

HOLIDAY SCHEDULE

Monday, May 30, 1994
Memorial Day

We Accept

MasterCard

VISA

Thanks for Traveling Peter Pan

FRAMINGHAM—BOSTON

READ DOWN

SCHEDULE NUMBER	500	502	504	506	508	510	512	514	518		304	314	520	452	112
Folder No. 7030A 3-25-94	MONDAY THRU FRIDAY										SAT. SUN. HOL.				
FREQUENCY	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H		67H	67H	67H	67H	67H
WORCESTER, MA . . . . . PPB Lv												9 15		12 45	5 40
Edgewater Hills (Fitness Ctr.) Lv	6 10	6 30	6 55	7 10											6 10
Edgewater Terrace Lv	6 13	6 33	6 58	7 13								9 40	12 20		6 15
Framingham Center Lv	6 15	6 35	7 00	7 15							7 55	9 45	12 25	1 20	6 20
Shopper's World (Bus Shelter-Rte. 9) Lv	6 20	6 40	7 05	7 20					4 40		8 00	9 50	12 35	1 25	
	↓	↓	↓	↓					↓		↓	↓	↓	↓	
Shopper's World (Peter Pan Booth-Rte. 30) Lv	6 30	6 50	7 15	7 30	7 50	8 10	8 35	9 10	4 45						
	Via Rte	Via Rte	Via Rte	Via Rte	Via Rte	Via Rte	Via Rte	Via Rte			Via Rte	Via Rte	Via Rte	Via Rte	
BOSTON (Copley Sq.) . . . . . Ar	6 55	7 15	7 40	7 55	8 15	8 35	9 00	9 35			8 35		12 55		
BOSTON (Park Sq.) . . . . . Ar	7 00	7 20	7 45	8 00	8 20	8 40	9 05	9 40			8 40		1 00		
BOSTON (State House) . . . . . Ar	7 05	7 25	7 50	8 05	8 25	8 45	9 10	9 45			↓		↓		
BOSTON (Peter Pan Term.) . . . . PPB Ar	7 30	7 30	7 55	8 10	8 30	8 50	9 15	9 50	5 30		8 45	10 25	1 05	1 55	6 40

7030A-0307dh

BOSTON—FRAMINGHAM

READ DOWN / READ DOWN

SCHEDULE NUMBER	501	503	307	509	511	513	515	519	521	523	305	525	529	131		533	535	537	539	529	131
Folder No. 7030B 3-25-94	MONDAY THRU FRIDAY															SAT. SUN. HOL.					
FREQUENCY	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H	X67H		6	7H	67H	6	67H	67H
BOSTON, MA (Peter Pan Term.) . . . . PPB Lv	7 10	7 55	10 00	3 00	3 45	4 00	↓	↓	5 00	↓	6 15	7 ↓	6 45	9 15		10 30	11 30	4 30	6 30	8 45	9 15
BOSTON (State House) Lv			↓	↓	↓	↓	4 15	4 45	↓	5 15	↓	6 40	↓			↓	↓	↓		↓	
BOSTON (Park Sq.) Lv			10 05	3 15	4 00	4 10	4 30	5 00	5 15	↓	5 30	5 50	6 50			10 35	11 35	4 35		8 50	
BOSTON (Copley Sq.) Lv			10 10	3 20	4 05	4 15	4 35	5 05	5 20	↓	5 35	5 55	6 55			10 40	11 40	4 40		8 55	
			Via Rte		Via Rte	Via Rte	Via Rte	Via Rte	Via Rte		Via Rte	Via Rte	Via Rte			Via Rte	Via Rte	Via Rte		Via Rte	
Shopper's World (Peter Pan Booth-Rte. 30) Ar	7 35	8 20		3 50	4 35	4 40	5 05	5 35	5 50	5 50	6 05	6 25									
			↓	↓		↓		↓		↓	↓	↓									
Shopper's World (Bus Shelter-Rte. 9) . . . Ar			10 30	3 51		4 41		5 36		5 51	6 05	6 26	7 20	9 40		11 00	12 00	5 00	8 00	7 20	9 40
Framingham Center . . . . . Ar						4 45		5 40		5 55	6 10	6 30	7 25	9 45		11 05	12 05	5 05	6 05	7 25	9 45
Edgewater Terrace . . . . . Ar						4 50		5 45		6 00	6 15	6 35	7 30	9 50		11 10	12 10	5 10	6 10	7 30	9 50
Edgewater Hills (Fitness Ctr.) . . . . . Ar								5 50		6 05	6 20	6 40	7 35			11 15	12 15			7 35	
								↓			↓		↓							↓	
WORCESTER, MA . . . . . PPB Ar			11 20										8 00					5 35		8 45	8 00

7030B-0307dh 7030C-0307dh

Gulbankian Bus Schedule

HUDSON, MARLBORO, SOUTHBORO TO BOSTON

DEPART Hudson Library	6:50 A	9:45 A	4:00 P
DEPART 250 Main Street and City Hall, Marlboro	7:05 A	10:00 A	4:15 P
DEPART Southboro Center	7:15 A	10:10 A	4:25 P
DEPART Southboro Cherry St.	7:20 A	10:15 A	4:30 P
ARRIVE Copley Square	7:55 A	10:50 A	5:05 P
ARRIVE John Hancock Center	7:55 A	10:50 A	5:05 P
ARRIVE Greyhound Bus Trm.	8:00 A	10:55 A	5:10 P
ARRIVE Park Square, Boston	8:05 A	11:00 A	5:15 P

RATES

	HUDSON to BOSTON	MARLBORO to BOSTON	SOUTHBORO to BOSTON
1-Way	$ 4.00	$ 3.50	$ 3.00
Round Trip	$ 8.00	$ 7.00	$ 6.00
10-Trip Book	$36.00	$31.50	$27.00

BOSTON TO SOUTHBORO, MARLBORO, HUDSON

DEPART Park Square, Boston	8:15 A	2:15 P	5:30 P
DEPART Copley Square	8:20 A	2:20 P	5:35 P
ARRIVE Southboro, Cherry St.	8:55 A	3:00 P	6:10 P
ARRIVE Southboro Center	9:00 A	3:05 P	6:15 P
ARRIVE Marlboro Main St.	9:10 A	3:15 P	6:25 P
ARRIVE Hudson Library	9:25 A	3:30 P	6:40 P

RATES

	BOSTON to HUDSON	BOSTON to MARLBORO	BOSTON to SOUTHBORO
1-Way	$ 4.00	$ 3.50	$ 3.00
Round Trip	$ 8.00	$ 7.00	$ 6.00
10-Trip Book	$36.00	$31.50	$27.00

For further information contact:

GULBANKIAN BUS LINES

40 MOUNT VICKERY ROAD, SOUTHBOROUGH, MA 01772
(508) 485-8988

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For All Your Transportation Needs.

Ride in Comfort with Us in Airconditioned Motor Coaches.

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Table 104.106 GREYHOUND LINES

BOSTON/SPRINGFIELD/PROVIDENCE—NEW YORK

READ DOWN

SCHEDULE NUMBER	2501	3001	3103	2925	3053	9651	3181	3105	3056	3067	3053	3089	123	3046	2923	3028	9653	3107	3141	3095	2927	3047
Folder No. 61 104 6-22-94													Worcester Line Text									
FREQUENCY																						
▲BOSTON, MA GL Lv	12 30	.....	6 00	7 00	7 30	v 7 00	.....	.....	8 00	8 30	9 00	9 30	.....	10 00	10 30	11 00	v11 15	11 30	.....	12 01	12 30	1 00
▲Newton (MBTA Riverside)	.....	.....	↓	↓	7 50	↓	.....	.....	↓	8 50	↓	9 50	.....	↓	10 50	↓	↓	11 50	.....	↓	12 50	↓
▲Worcester	↓	.....	7 00	↓	8 40	↓	.....	↓	↓	↓	↓	10 40	.....	↓	↓	↓	↓	12 40	.....	↓	↓	↓
▲SPRINGFIELD, MA Ar	↓	.....	↓	↓	↓	↓	.....	.....	↓	10 20	↓	↓	.....	↓	12 20	↓	↓	↓	.....	↓	2 20	↓
▲Springfield, MA Lv	↓	.....	↓	↓	↓	↓	.....	8 30	↓	10 30	↓	↓	11 15	↓	12 30	↓	↓	↓	.....	↓	2 30	↓
▲Hartford, CT Ar	↓	.....	8 20	↓	10 00	↓	.....	9 15	↓	11 15	↓	12 01	11 68	↓	1 16	↓	↓	2 00	.....	↓	3 15	↓
▲Hartford, CT Lv	↓	5 30	8 30	↓	10 10	↓	.....	9 45	↓	11 25	↓	12 10	12 18	↓	1 25	↓	↓	2 10	.....	↓	3 25	↓
▲New Britain, CT	↓	5 55	8 50	↓	↓	↓	.....	10 06	↓	↓	↓	↓	12 36	↓	1 45	↓	↓	↓	.....	↓	3 46	↓
▲PROVIDENCE, RI Ar	↓	↓	↓	↓	↓	v 8 00	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	v 12 18	↓	.....	↓	↓	↓
▲PROVIDENCE, RI Lv	↓	↓	↓	↓	↓	.....	8 15	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	12 20	↓	↓	↓
▲New London, CT	↓	↓	↓	↓	↓	.....	8 20	↓	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	1 40	↓	↓	↓
▲New Haven (LB) Ar	↓	8 35	↓	↓	↓	.....	10 20	10 45	↓	↓	↓	↓	1 18	↓	↓	↓	.....	↓	2 40	↓	↓	↓
▲New Haven (LB) Lv	↓	8 45	↓	↓	↓	.....	10 30	10 55	↓	↓	↓	↓	1 25	↓	↓	↓	.....	↓	2 45	↓	↓	↓
▲Bridgeport	↓	7 20	↓	↓	↓	.....	↓	11 25	↓	↓	↓	↓	1 65	↓	↓	↓	.....	↓	3 15	↓	↓	↓
▲Stamford, CT	↓	8 10	↓	↓	↓	.....	↓	11 50	↓	↓	↓	↓	2 30	↓	↓	↓	.....	↓	3 50	↓	↓	↓
▲New Rochelle, NY	↓	8 40	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓	3 00	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲White Plains	↓	↓	↓	↓	↓	.....	↓	12 30	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	4 20	↓	↓	↓
‡Harlem	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	4 45	↓	↓	↓
▲NEW YORK, NY GL Ar	4 50	9 20	11 15	11 20	12 40	.....	12 30	1 20	12 20	1 30	1 20	2 40	3 45	2 30	4 10	3 30	.....	5 05	6 30	4 30	6 10	5 20

Z104A-0618dh Z104B-0524dh

● — Will operate Mon., July 4 instead of Sun., July 3.
Will operate Mon., Sept. 5 instead of Sun., Sept. 4.
VT or v — Vermont Transit Co.

READ DOWN

SCHEDULE NUMBER	127	3077	3081	9656	3163	2909	3049	129	2921	3099	2923	3051	3115	2911	133	3083	2913	3087	2915	3089
Folder No. 61 104 6-22-94	Worcester Line Text							Worcester Hartford							Worcester Hartford 67●				● 67	
FREQUENCY																				
▲BOSTON, MA GL Lv	.....	1 30	2 00	v 2 16	.....	2 30	3 00	.....	3 30	4 00	4 30	6 00	6 30	6 00	.....	7 00	7 00	8 00	10 00	10 00
▲Newton (MBTA Riverside)	.....	1 50	↓	↓	.....	2 50	↓	.....	3 50	↓	4 50	↓	6 50	↓	.....	7 20	↓	8 20	↓	↓
▲Worcester	.....	2 40	↓	↓	.....	↓	↓	.....	4 40	↓	↓	↓	6 40	↓	.....	↓	↓	↓	↓	↓
▲SPRINGFIELD, MA Ar	.....	↓	↓	↓	.....	4 20	↓	.....	↓	↓	6 20	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲SPRINGFIELD, MA Lv	3 00	↓	↓	↓	.....	4 30	↓	5 10	↓	↓	6 30	↓	↓	↓	.....	7 35	↓	↓	↓	↓
▲Hartford, CT Ar	3 45	4 00	↓	↓	.....	5 15	↓	5 56	5 45	↓	7 15	↓	8 00	↓	.....	8 10	↓	10 05	↓	12 05
▲Hartford, CT Lv	3 55	4 10	↓	↓	.....	5 25	↓	↓	6 10	↓	7 25	↓	8 10	↓	↓	8 15	↓	10 15	↓	12 15
▲New Britain, CT	4 20	↓	↓	↓	.....	5 46	↓	.....	↓	↓	↓	↓	8 30	↓	.....	↓	↓	10 36	↓	↓
▲PROVIDENCE, RI Ar	↓	↓	↓	v 3 15	→	↓	↓	.....	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲PROVIDENCE, RI Lv	↓	↓	↓	.....	3 30	↓	↓	.....	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲New London, CT	↓	↓	↓	.....	4 40	↓	↓	.....	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲New Haven (LB) Ar	4 00	↓	↓	.....	5 45	↓	↓	.....	7 00	↓	↓	↓	↓	↓	.....	10 05	↓	↓	↓	↓
▲New Haven (LB) Lv	4 10	↓	↓	.....	5 45	↓	↓	.....	7 15	↓	↓	↓	↓	↓	.....	10 10	↓	↓	↓	↓
▲Bridgeport	4 40	↓	↓	.....	6 15	↓	↓	.....	7 45	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲Stamford, CT	5 15	↓	↓	.....	6 50	↓	↓	.....	8 15	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲New Rochelle, NY	5 45	↓	↓	.....	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲White Plains	↓	↓	↓	.....	7 20	↓	↓	.....	8 45	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
‡Harlem	↓	↓	↓	.....	↓	↓	↓	.....	9 10	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	↓
▲NEW YORK, NY GL Ar	6 40	7 05	6 30	.....	8 30	8 10	7 30	.....	9 40	8 30	6 80	9 30	11 05	10 30	.....	12 05	11 20	1 00	2 20	2 45

Z104C-0524dh Z104D-0518dh

NEW YORK—PROVIDENCE/SPRINGFIELD/BOSTON

READ DOWN

SCHEDULE NUMBER	3000	3002	3160	9660	3000	122	2900	3110	3044	134	2918	2922	2904	3096	2908	3162	9652	2908	2910	3084	128	3074	3094
Folder No. 61 104 6-22-94						Hartford Worcester				New York Line Text											New York Hartford		
FREQUENCY																							
▲NEW YORK, NY GL Lv	12 30	2 30	7 00	.....	8 15	.....	7 00	7 30	8 00	8 15	8 30	9 00	9 30	10 00	10 30	10 15	.....	11 00	11 30	12 01	12 01	12 30	1 00
▲White Plains	↓	↓	7 55	.....	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	12 68	↓	↓
▲New Rochelle, NY	↓	↓	↓	.....	↓	.....	↓	↓	↓	9 05	↓	↓	↓	↓	↓	11 10	.....	↓	↓	↓	↓	↓	↓
▲Stamford, CT	↓	↓	8 25	.....	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	11 40	.....	↓	↓	↓	1 25	↓	↓
▲Bridgeport	↓	↓	9 00	.....	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	12 15	.....	↓	↓	↓	2 00	↓	↓
▲New Haven (LB) Ar	↓	↓	9 30	.....	↓	.....	↓	↓	↓	10 25	↓	↓	↓	↓	↓	12 46	.....	↓	↓	↓	2 30	↓	↓
▲New Haven (LB) Lv	↓	↓	9 45	.....	↓	.....	↓	↓	↓	10 35	↓	↓	↓	↓	↓	12 50	.....	↓	↓	↓	2 35	↓	↓
▲New London, CT	↓	↓	10 45	.....	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	1 60	.....	↓	↓	↓	↓	↓	↓
▲PROVIDENCE, RI Ar	↓	↓	11 55	.....	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	3 00	.....	↓	↓	↓	↓	↓	↓
▲PROVIDENCE, RI Lv	↓	↓	↓	v 12 30	↓	.....	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	v 3 30	↓	↓	↓	↓	↓	↓
▲New Britain, CT	↓	↓	.....	↓	8 40	↓	↓	↓	↓	11 15	↓	↓	11 66	↓	↓	↓	↓	↓	1 65	↓	3 15	↓	↓
▲Hartford, CT Ar	↓	5 00	.....	↓	9 00	→	↓	10 00	↓	11 35	11 00	↓	12 16	↓	1 00	↓	↓	↓	2 16	↓	3 35	3 00	↓
▲Hartford, CT Lv	↓	5 10	.....	↓	9 10	9 20	↓	10 10	↓	11 45	11 10	↓	12 26	↓	1 10	↓	↓	↓	2 25	↓	3 45	3 10	↓
▲SPRINGFIELD, MA Ar	↓	↓	.....	↓	↓	10 00	↓	↓	↓	12 26	11 50	↓	↓	↓	1 60	↓	↓	↓	↓	↓	4 40	3 50	↓
▲SPRINGFIELD, MA Lv	↓	↓	.....	↓	↓	↓	↓	↓	↓	↓	12 01	↓	↓	↓	2 00	↓	↓	↓	↓	↓	↓	4 00	↓
▲Worcester	↓	↓	.....	↓	↓	↓	↓	11 30	↓	↓	↓	↓	1 40	↓	↓	↓	↓	↓	3 40	↓	↓	↓	↓
▲Newton (MBTA Riverside)	↓	↓	.....	↓	10 55	↓	↓	12 25	↓	↓	1 25	↓	2 36	↓	3 25	↓	↓	↓	4 30	↓	↓	6 25	↓
▲BOSTON, MA GL Ar	4 50	7 05	.....	v 1 30	11 15	.....	11 20	12 45	12 20	.....	1 46	1 20	2 66	2 20	3 46	.....	v 4 30	3 20	4 60	4 20	.....	6 45	6 20

Z104E-0618dh Z104F-0527dh

● — Will operate Mon., July 4 instead of Sun., July 3.
Will operate Mon., Sept. 5 instead of Sun., Sept. 4.
VT or v — Vermont Transit Co.

READ DOWN

SCHEDULE NUMBER	3076	3106	2914	3082	3114	3046	3158	3056	9654	3024	3048	3054	134	3102	3022	3050	3098	3066	3086
Folder No. 61 104 6-22-94													Hartford Worcester 67						
FREQUENCY																			
▲NEW YORK, NY GL Lv	1 30	3 00	2 30	3 00	3 30	4 00	4 00	4 30	.....	5 00	5 30	6 00	.....	6 00	7 00	8 00	9 00	9 00	10 30
▲White Plains	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	.....	6 46	↓	↓	↓	↓	↓
▲New Rochelle, NY	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓
▲Stamford, CT	↓	↓	↓	↓	↓	↓	↓	↓	.....	↓	↓	↓	.....	7 25	↓	↓	↓	10 25	↓
▲Bridgeport	↓	↓	↓	↓	↓	↓	5 60	↓	.....	↓	↓	↓	.....	8 00	↓	↓	↓	11 00	↓
▲New Haven (LB) Ar	↓	↓	↓	↓	↓	↓	6 20	↓	.....	↓	↓	↓	.....	8 30	↓	↓	↓	11 30	↓
▲New Haven (LB) Lv	↓	↓	↓	↓	↓	↓	6 30	↓	.....	↓	↓	↓	.....	8 35	↓	↓	↓	11 35	↓
▲New London, CT	↓	↓	↓	↓	↓	↓	7 30	↓	.....	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓
▲PROVIDENCE, RI Ar	↓	↓	↓	↓	↓	↓	8 36	↓	.....	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓
▲PROVIDENCE, RI Lv	↓	↓	↓	↓	↓	↓	.....	↓	v 9 00	↓	↓	↓	.....	↓	↓	↓	↓	↓	↓
▲New Britain, CT	↓	↓	↓	↓	5 55	↓	.....	↓	.....	↓	↓	↓	.....	9 15	↓	↓	↓	12 15	↓
▲Hartford, CT Ar	4 00	↓	5 00	↓	6 10	↓	.....	7 00	↓	↓	8 00	↓	.....	9 36	↓	10 30	11 30	12 35	D 1 00
▲Hartford, CT Lv	4 10	↓	5 10	↓	6 20	↓	.....	7 10	↓	↓	8 10	↓	9 00	9 45	↓	10 40	11 40	.....	D 1 10
▲SPRINGFIELD, MA Ar	↓	↓	5 50	↓	7 00	↓	.....	↓	↓	↓	↓	↓	9 35	10 10	↓	↓	↓	.....	↓
▲SPRINGFIELD, MA Lv	↓	↓	6 00	↓	7 10	↓	.....	↓	↓	↓	↓	↓	.....	↓	↓	↓	↓	.....	↓
▲Worcester	5 20	↓	↓	↓	↓	↓	.....	8 40	↓	↓	9 30	↓	.....	.....	↓	↓	↓	.....	↓
▲Newton (MBTA Riverside)	6 50	↓	7 25	↓	8 35	↓	.....	9 30	↓	↓	10 20	↓	.....	.....	↓	↓	↓	.....	↓
▲BOSTON, MA GL Ar	7 10	8 20	7 40	7 20	8 53	8 20	.....	9 45	v 10 00	9 30	10 40	10 20	.....	.....	11 20	12 35	1 35	.....	3 05

Z104G-0518dh Z104H-0520dh

Vanpools, Carpools and Park and Ride Lots

In the past 10 years, vanpools and carpools have become an increasingly important form of transportation. Vanpools and carpools are a part of a balanced transportation system that the Federal government supports with funding. Caravans for Commuters, Inc. is a private non-profit organization that promotes and assists in establishing vanpools and carpools. Some of Caravan's funding is provided by the Federal Highway Administration and the Massachusetts Highway Department as a way to reduce congestion on the highway system. The implementation of the 1990 Clean Air Act Amendments gave further support to the development and expansion of vanpools and carpools.

According to Caravans for Commuters, Inc., 24 vanpools with destinations in Boston operate in the Worcester corridor. Each van has a capacity of 15 passengers; average ridership is 12 people. Vanpools, therefore, currently carry approximately 300 people each work day to various destinations in downtown Boston. The 24 Boston-bound vanpools have the following origination points:

Table 1.3-1 Existing Study Area Vanpools

Origin	No. of Vans
Downtown Worcester	7
Auburn	2
Millbury Park and Ride Lot	6
Shrewsbury	2
Westborough	2
Marlborough	2
Framingham	3
TOTAL	**24**

Caravans for Commuters, Inc., also provides a free service called RideSource, which allows people access to a computerized database that matches commuters with similar origins and destinations for the purpose of forming carpools. No specific estimate of the number of carpools that are operating in the Worcester area is available.

The Massachusetts Turnpike Authority carpool pass program significantly lowers the cost of tolls for carpools with 3 or more people. The specifics of the Turnpike carpool pass program are as follows:

1. A carpool pass may be used for cars or vans not for hire with three or more passengers (of any age) on all interchanges of the Massachusetts Turnpike and the Sumner/Callahan Tunnels.

2. The pass may be used any day of the year, at any hour of the day.

3. It may be exchanged within the carpool group and is not restricted to a certain vehicle.

4. The pre-paid pass card is presented to a toll booth operator, who runs the card through a computer. Therefore, the automatic lanes may not be used.

5. An express lane specifically for carpools operates at the Beacon Park Toll Plaza (Interchange 19) from 6:00 - 9:30 A.M. eastbound and 3:30 to 6:30 P.M. westbound, with lane use enforced by a state police officer.

6. If the pass is not purchased by the beginning of the renewal period on March 1st, the price is pro-rated according to the date of purchase.

7. A damaged card will be replaced by the Turnpike, but a lost or stolen card will not.

8. The cost of the pass depends upon the interchange at which the vehicle enters and exits. Eight zones and their annual prices are listed below:

Table 1.3-2 Massachusetts Turnpike Carpool Pass Program

ZONE PASS TYPE	PLAN COST	PLAN #	INTERCHANGES 1	2	3	4	5	6	7	8	9	10	11	11A	12	13	14	15	16	17	18	19	20	21	22	23	24
INT # 1-8	$25.00	1	■	■	■	■	■	■	■	■																	
INT # 8-15	$25.00	2								■	■	■	■	■	■	■	■	■									
INT # 1-17	$50.00	3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
INT # 1-24	$75.00	4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
INT # 15-24	$50.00	5																■	■	■	■	■	■	■	■	■	■
INT # 15-17	$25.00	6																■	■	■							
INT # 17-24	$25.00	7																		■	■	■	■	■	■	■	■
TUNNELS ONLY	$25.00	8																									

Park and Ride Lots

Park and ride lots function to support the carpool and vanpool programs as well as bus routes. The Massachusetts Turnpike Authority has established two free park and ride lots, one at Turnpike Exit 11 in Millbury and the other at the Douglas Drug shopping mall on Route 122 in Worcester. Providing free park and ride facilities encourages the use of high occupancy vehicles (HOVs) on the Turnpike.

The Millbury Park and Ride lot has 150 spaces located adjacent to the tandem truck parking area. Space for 30 additional vehicles is available as overflow parking on the access drive. Amenities at the lot include a bus shelter, newspaper vending machine, public telephones and parking lot lighting. The lot is completely full by 7:30 A.M. on most weekday mornings.

The Massachusetts Highway Department Park and Ride Lot at Shopper's World Mall on Route 9 in Framingham is serviced by buses destined for Boston. This lot is used by an estimated 250 commuters per day. A separate lot of some 300 spaces serves Massport's Logan Express service. This lot ordinarily is full, but serves air passengers rather than daily commuters.

Rail Passenger Service

Amtrak Passenger Service

Amtrak operates intercity rail service from Boston's South Station to Springfield and points west, with stops at Framingham and Worcester. There are seven trains a day; three inbound to Boston and four outbound from Boston.

Trains inbound to Boston depart Worcester at 2:24 P.M., 3:53 P.M., and 9:35 P.M. Westbound departure times from South Station are 1:30 A.M., 6:23 A.M., 2:13 P.M. and 4:55 P.M. The current Amtrak schedule offers no utility for daily commute-to-work trips and the $11.00 one way fare is considerably more than the express bus fare.

MBTA Commuter Rail Service

The MBTA currently provides commuter rail service between Framingham and South Station, with nine intermediate station stops. The commuter rail schedule, fares, and local bus connections are shown on following pages.

Table 1.3-3, Framingham Line Ridership Trends and Parking, indicates there has been a substantial increase in ridership over the past several years. Ridership is approaching 4,000 inbound boardings a day, or a total of nearly 8,000 one way trips daily. This trend is consistent with systemwide ridership which has increased from 50,000 riders daily in 1987 to nearly 75,000 passenger trips daily in 1992 (Table 1.3-4).

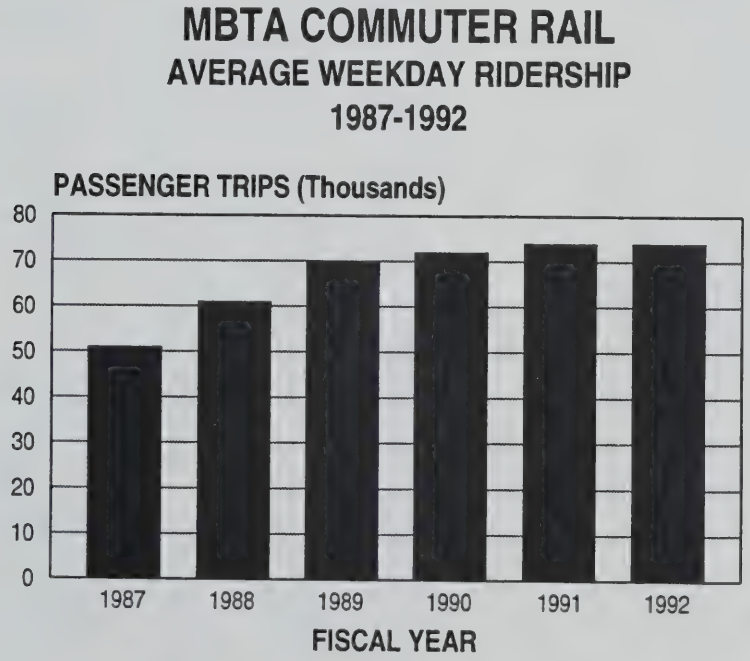
Parking at stations is limited. At Framingham, the MBTA owned parking lot has a capacity of 121 vehicles; the City of Framingham allows parking that accommodates between 100 and 150 cars adjacent to Route 135 near the station.

Table 1.3-3 Framingham Line Ridership Trends and Parking

Station	MBTA Audits of Inbound Boardings					MBTA Parking Spaces	Other Commuter Parking Spaces
	1988	1989	1990	1991	1992		
Back Bay	–	–	–	–	54	0	0
Newtonville	185	235	379	438	428	0	0
West Newton	35	81	95	143	162	0	45*
Auburndale	26	134	111	154	204	30	0
Wellesley Farms	256	373	433	500	385	0	195*
Wellesley Hills	226	329	337	390	348	0	52*
Wellesley Square	349	487	469	611	545	0	233*
Natick	338	398	457	462	562	0	71*
West Natick	397	551	495	599	647	163	0
Framingham	479	755	719	547	624	121	115*
TOTALS	**2,291**	**3,343**	**3,495**	**3,844**	**3,959**	**314**	**711**

* *Other commuter parking spaces are located in municipal parking lots, with the exception of the 45 spaces in W. Newton, which are located in a church parking lot on Washington Street. The total 711 spaces are not always available for rail commuters.*

Table 1.3-4 MBTA Commuter Rail Systemwide Ridership Trends



MONDAY THROUGH FRIDAY

INBOUND		Train No.	502	504	506	508	510	512	514	516	518	520	522	526	528	530	532
READ DOWN	ZONE		A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	A.M.
Dep: Framingham	5	O	6 15	7 00	7 30	8 00	8 35	10 00	12 05	2 00	3 45	5 30	6 40	8 20	9 20	11 05	12 05
West Natick	4	O	6 19	7 05	7 34	8 04	8 39	10 03	12 08	2 03	3 49	5 33	6 44			11 08	12 08
Natick	4		6 24	7 10	7 39	8 09	8 44	10 08	12 13	2 08	3 53	5 38	6 49			11 13	12 13
Wellesley Square	3		6 29	7 15	7 44	8 14	8 49	10 12	12 17	2 12	3 57	5 44	6 54			11 17	12 17
Wellesley Hills	3		6 32	7 18	7 48	8 17	8 52	10 15	12 20	2 15	4 00	5 48	6 57			11 20	12 20
Wellesley Farms	3		6 35	7 21	7 52	8 20	8 55	10 18	12 23	2 18	4 03	5 51	7 00			11 23	12 23
Auburndale	2		6 39	7 25	7 56	8 24	8 58	10 21	12 26	2 21	4 06						12 26
West Newton	2		6 42	7 28	7 59	8 28	9 02	10 24	12 29	2 24	4 09						12 29
Newtonville	1		6 45	7 32	8 03	8 32	9 05	10 27	12 32	2 27	4 12						12 32
Back Bay	1A	⊕ O	L6 57	L7 45	L8 15	L8 44	L9 17	L10 40	L12 45	L2 40	L4 25	L6 10	L7 20	L8 55	L9 50	L11 43	L12 43
Arr: South Station		⊕ O	7 02	7 50	8 20	8 49	9 22	10 45	12 50	2 45	4 30	6 15	7 25	9 00	9 55	11 48	12 48

OUTBOUND		Train No.	501	503	505	507	509	511	513	515	517	519	521	523	525	527	529	531
READ DOWN	ZONE		A.M.	A.M.	A.M.	A.M.	A.M.	A.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.	P.M.
Dep: South Station		⊕ O	5 00	5 20	6 50	7 35	9 05	11 05	12 55	2 40	4 30	5 00	5 30	6 05	6 55	8 20	10 05	11 05
Back Bay	1A	⊕ O		5 25	6 55	7 40	9 10	11 10	1 00	2 45	4 35	5 05	5 35	6 10	7 00	8 25	10 10	11 10
Newtonville	1							11 21	1 11	2 56	4 46	5 17	5 47	6 22	7 12	8 36	10 21	11 21
West Newton	2							11 24	1 14	2 59	4 49	5 20	5 50	6 25	7 15	8 39	10 24	11 24
Auburndale	2							11 27	1 17	3 02	4 53	5 23	5 54	6 29	7 19	8 42	10 26	11 26
Wellesley Farms	3						9 25	11 31	1 21	3 06	4 57	5 27	5 58	6 33	7 23	8 46	10 30	11 30
Wellesley Hills	3				7 13	7 58	9 28	11 34	1 24	3 09	5 01	5 30	6 02	6 37	7 26	8 49	10 33	11 33
Wellesley Square	3				7 17	8 02	9 31	11 37	1 27	3 12	5 05	5 33	6 06	6 41	7 30	8 52	10 36	11 36
Natick	4				7 22	8 07	9 36	11 42	1 32	3 17	5 10	5 38	6 11	6 46	7 35	8 57	10 41	11 41
West Natick	4	O			7 26	8 11	9 40	11 46	1 36	3 21	5 14	5 43	6 15	6 50	7 40	9 01	10 46	11 46
Arr: Framingham	5	O	5 35	5 55	7 30	8 15	9 44	11 50	1 40	3 25	5 18	5 48	6 19	6 54	7 44	9 05	10 50	11 50

COMMUTER RAIL CONNECTIONS

FRAMINGHAM
Amtrak service to Chicago, New York and Washington
Framingham L.I.F.T. Bus service to Ashland, Hopkinton, Shopper's World and Framingham Industrial Park
Big W Trans Bus service to Milford

WEST NATICK

NATICK

WELLESLEY SQUARE

WELLESLEY HILLS

WELLESLEY FARMS

AUBURNDALE
58 T Bus to Newton Corner via Waltham Square
305 T Bus to Waltham Central Sq. and Downtown Boston

WEST NEWTON
53 T Bus to Brandeis/Roberts and Waltham Central Sq.
54 T Bus to Waverly Station and Waltham Central Sq.

NEWTONVILLE
53 T Bus to Brandeis/Roberts and Waltham Central Sq.
54 T Bus to Waverley Station and Waltham Central Sq.
56 T Bus to Waltham Highlands and Waltham Central Sq.
59 T Bus to Needham Junction Station and Watertown Sq.

BACK BAY
Orange Line
Amtrak service to Chicago, New York and Washington
Bonanza and Englander Intercity Bus Connections
10 T Bus to University Hospital and City Hospitals
39 T Bus to Forest Hills Station via Huntington Ave.

SOUTH STATION
Red Line
Amtrak service toChicago ,New York and Washington
Greyhound, Peter Pan and P & B Bus Connections
6 T Bus to Marine Industrial Park and World Trade Center
7 T Bus to South Boston

Commuter Rail

COMMUTER RAIL FARES

Zone	One-Way	Half-Fare	Half-Fare 10 Ride	12 Ride	Monthly Pass	Family* Fare
1A	$0.85	$0.40	$ 4.00	$ 8.50	$ 27.00	$ 3.40
1B	1.25	0.60	6.00	12.50	27.00	5.00
1	2.00	1.00	10.00	20.00	64.00	8.00
2	2.25	1.10	11.00	22.50	72.00	9.00
3	2.50	1.25	12.50	25.00	82.00	10.00
4	3.00	1.50	15.00	30.00	94.00	12.00
5	3.25	1.60	16.00	32.50	104.00	13.00
6	3.50	1.75	17.50	35.00	112.00	14.00
7	3.75	1.85	18.50	37.50	120.00	15.00
8	4.00	2.00	20.00	40.00	128.00	16.00
9	4.75	2.35	23.50	47.50	136.00	19.00
10	5.50	2.75	27.50	55.00	144.00	22.00
11	6.00	3.00	30.00	60.00	150.00	24.00

Interzone Fares

Zones Travelled	One-Way	Half-Fare	Monthly Pass	Family* Fare
1	$1.50	$0.75	$ 48.00	$ 6.00
2	1.75	0.85	55.00	7.00
3	2.00	1.00	62.00	8.00
4	2.25	1.10	69.00	9.00
5	2.50	1.25	76.00	10.00
6	2.75	1.35	83.00	11.00
7	3.00	1.50	90.00	12.00
8	3.25	1.60	97.00	13.00
9	3.50	1.75	104.00	14.00
10	3.75	1.85	111.00	15.00
11	4.00	2.00	118.00	16.00

Surcharge: A non-refundable surcharge is added to all on-board purchases when tickets are available at a local outlet.
$2.00 surcharge – peak hours $1.00 surcharge -- off-peak hours
(Shaded portions of public timetables denote peak hours)
* **FAMILY FARE** not valid during peak hours.

1.4 Proposed Transportation Improvements By Others

Within the study corridor several other major transportation improvements are in various stages of implementation.

Union Station Worcester (EOEA #9521)

Based on a feasibility study done in early 1991, and a renovation feasibility report completed in 1993 the Worcester Redevelopment Authority and the Worcester Regional Transit Authority, as co-proponents, propose to develop an Intermodal Transportation Center at the vacant Union Station at Washington Square in downtown Worcester. The transportation center would include facilities for inter- and intra-city buses, Amtrak passenger trains, and MBTA commuter rail service.

The Union Station project involves components of transportation, economic development, and historic preservation. While MBTA commuter rail is accommodated in the redevelopment plans for the station site, the project will proceed with or without the commuter rail extension. The projected Union Station opening date is November, 1997.

Restoration/rehabilitation of Union Station as an Intermodal Transportation Center will include transportation services (offices, waiting rooms, ticket booths, etc.), general office space, retail food service (restaurants and possible food court), other retail space (not related to food), and museum and tourist information area. The station also will be a logical terminal point for the proposed Blackstone River Bikeway.

Reconstruction of Route 146, Millbury-Worcester (EOEA #6180)

The Massachusetts Highway Department and the Massachusetts Turnpike Authority, as co-proponents, propose to upgrade approximately four miles of Route 146 in Worcester County, Massachusetts from two to four lanes between I-290 in Worcester and the railroad bridge just south of the intersection of Route 146 and Route 122A in Millbury, as well as to construct a new Massachusetts Turnpike/Route 146/ Route 20 Interchange. Also proposed are improvements to the existing interchange between Route 146 and I-290 at Brosnihan Square in Worcester, widening Route 20 from one to four lanes between the intersection of Granite Street/Park Hill Avenue and Greenwood street in Millbury, and construction of a grade-separated interchange at Route 146 and Route 122A in Millbury.

The project is in the early design stage and construction of the improvements is not anticipated to be complete until after the year 2000. While the project will add a new interchange to the Turnpike, improving access for Worcester, and likely redistributing traffic currently using Exit 10 in Auburn and Exit 11 in Millbury, the Route 146 project does not add mainline capacity to the Turnpike and may increase mainline demand.

With the exception of the new interchange for Route 146 in Millbury, there is no major turnpike construction project planned in the study corridor. The Turnpike Authority previously had evaluated widening the Turnpike to four lanes in each direction between Weston and Framingham, however, this proposal was dropped in consideration of costs, environmental effects, and strong opposition.

Massachusetts Turnpike TDM

The Turnpike Authority currently is developing Traffic Demand Management (TDM) initiatives with the objective of reducing traffic volumes and congestion, as part of a state effort to comply with the mandates of the Federal Clean Air Act and its amendments. Among the options being implemented are:

- Expansion of Park and Ride Lots - currently an additional 1500 spaces are proposed at various Turnpike exits.
- Expansion of Carpool Programs - the existing carpool pass program will be continued and efforts made to increase participation.
- Installation of Electronic Toll and Traffic Management (ETTM) and Automated Vehicle Identification (AVI) Systems to reduce toll plaza congestion.
- Evaluation of the feasibility of creating high occupancy vehicle (HOV) lanes.

Massachusetts Highway Department

There is a continual program of reconstruction throughout the state to improve the efficiency and safety of the existing highway network for example, the Route 146 project cited above. These projects often are carried out at the request of, and with the cooperation of, local communities. Localized capacity improvements frequently are constructed as mitigation for private developments; these improvements generally are reviewed and approved by the Massachusetts Highway Department (MHD) if changes to a state highway are involved. However, the MHD has no proposed major projects to increase capacity through construction of new roadways in the study corridor.

Framingham Commuter Rail Station

The Massachusetts Bay Transportation Authority (MBTA) proposes to improve commuter safety and accessibility, track operations, and parking at Framingham station, currently the terminus for Boston metrowest commuter rail service.

The project will consist of two phases. Phase 1 will include construction of a pedestrian overpass with handicapped access; extension of the inbound platform to approximately 730 feet and the outbound platform to approximately 815 feet with covered access; installation of fence between the inbound and outbound tracks, to prevent crossings; and reconstruction of parking south of the tracks with an increase from 40 to 50 spaces, including several handicapped accessible spaces, and a commuter drop off/pick-up area.

Approximately 1400 linear feet of track will be relocated to increase the sub-standard track centers from 12 feet to 14 feet. The existing south-east wye track, which crosses Waverly Street at grade, will be retired from service.

Phase 2 improvements will include drainage improvements and construction of an additional parking area to the north of the proposed platforms built in Phase 1.

The proposed project will upgrade track operations for inbound and outbound rail traffic and provide a safer and more accessible environment for MBTA commuters in conformance with the Americans with Disabilities Act. The Phase 1 improvements will be addressed in a separate MEPA process; an ENF will be submitted by the MBTA in 1994. Phase 2 is not currently programmed.

Double Stack Container Rail Freight

To accommodate interstate freight service and to help revitalize the Port of Boston, the Executive Office of Transportation and Construction (EOTC) has designated certain rail lines in Massachusetts as "double stack" corridors, and made a commitment to the line operators to assist in improving vertical clearance on these corridors to at least 20'-8" to allow for movement of freight cars with double stack containers. The portion of the Conrail mainline west of Framingham is one of the double stack rail corridors designated by EOTC; however, between Worcester and Framingham there are several existing bridges over the railroad that do not provide the necessary 20'-8" minimum vertical clearance. The inability to ship containerized freight double stacked all the way to Boston has placed Massachusetts's railroads and the Port of Boston at a competitive disadvantage with respect to other Atlantic coast railroads and ports.

1.5 History of Project

Project Background

The Worcester Commuter Rail Extension Project has evolved and taken shape as an integral part of regional transportation and environmental initiatives. As described below, the project is one of a number of proposed public transportation projects with short and long term regional transportation and air quality benefits.

During the late 1970s and early 1980s, the Commonwealth made substantial capital investments in mass transportation corridors in the metro-Boston region, e.g., the Red Line Extensions north and south and the Southwest Corridor Project. Simultaneously, the Commonwealth was engaged in planning the massive Central Artery/Tunnel Project to complete the Interstate Highway system in Massachusetts and to improve the capacity and safety of existing highway facilities. The environmental review of the Central Artery/Tunnel Project undertaken between 1987 and 1991 refocussed the attention of state officials on the relationship between transportation systems and air quality and the role of mass transportation in a balanced transportation system. The ensuing debate produced convincing evidence that highway infrastructure improvements, despite their beneficial effects, must be accompanied by transportation demand management and demand reduction designed to achieve successful functioning of the regional transportation system as a whole and to minimize future growth in traffic volumes seeking to use the region's necessarily limited highway capacity.

New federal air quality mandates, e.g., the 1990 Federal Clean Air Act Amendments discussed below, highlighted the need to construct mass transportation improvements and to devise other transportation strategies to achieve compliance with the State Implementation Plan (SIP). The Central Artery/Tunnel Project (and other proposed highway improvements, such as the Route 146/Massachusetts Turnpike Interchange Project in Worcester and Millbury discussed above) served as the catalyst for discussion and formulation of a strategy to expand mass transportation capacity and to introduce new services to support existing capacity in tandem with other air quality improvement measures.

A key element of the Commonwealth's strategy is the expansion and improvement of the commuter rail system. On September 27, 1990, the Secretary of the Executive Office of Transportation and Construction and the Secretary of Environmental Affairs endorsed the "Massachusetts Transportation Agenda" making improved mass

transportation, including commuter rail expansion, among the Commonwealth's highest transportation priorities. Thereafter, the Executive Office of Transportation and Construction identified a range of specific mass transportation improvements and made commitments to pursue a program of mass transportation improvements and control measures to reduce low occupancy vehicles use. These commitments are reflected in the record of environmental review and approval of the Central Artery/Tunnel Project, see e.g., the Secretary of Environmental Affairs' Certificate on the Final Supplemental Environmental Impact Statement, the Federal Highway Administration's Record of Decision, and the Massachusetts Highway Department's Section 61 Finding pursuant to the Massachusetts Environmental Policy Act. Many of the proposed transportation improvements and control measures are the subject of state regulations, amendments to the State Implementation Plan (SIP), and other public approval processes which are either ongoing or completed. The Worcester Commuter Rail Extension project is a state regulatory requirement, 310 CMR 7.36 (2)(c)(2), an element in the current Massachusetts Transportation Improvement Program, and an enforceable provision of the SIP.

MEPA Chronology

The Environmental Notification Form (ENF) for the Worcester Commuter Rail Extension Project was submitted to the Secretary of Environmental Affairs on August 17, 1992 and was noticed in the Environmental Monitor dated August 24, 1992.

Following the comment period, the Secretary on October 8, 1992 issued a Certificate establishing a Special Procedure for a Major and Complicated Project. This certificate established a Citizens Advisory Committee (CAC) to assist the Secretary in the review and evaluation of the environmental impacts of the project. The certificate on the ENF was issued on October 22, 1992, defining the scope of issues to be addressed in the environmental impact report (EIR) required on the project.

A Draft EIR was filed for the overall project and was noticed in the Environmental Monitor of August 8, 1993. Many thoughtful comments were received on the DEIR concerning a wide range of environmental and financial issues. Given the need for significant additional information identified in the comments, the MBTA determined that it was appropriate to withdraw the DEIR in order to address the comments in a substantially revised document.

Concurrent with the request that the DEIR be withdrawn, the MBTA filed a Notice of Project Change on November 29, 1993 that proposed an interim commuter rail service to Worcester. After careful evaluation of the proposed interim service and its potential impacts, and taking into account the comments received on the Notice of

Project Change, the Secretary issued an opinion dated January 14, 1994 that the implementation of interim service would have limited environmental impact and could proceed without further review under MEPA.

Coordination with Affected Communities

The MBTA's public participation process for the Worcester Commuter Rail Extension Project began in January 1992 as part of the schematic design phase. During January, February and March of 1992, the MBTA and its consultant met frequently with towns along the project corridor. Questions and concerns about the sites that were recommended in the 1990 Feasibility Study were identified and discussed. Three intermediate sites between Framingham and Worcester (Howe Street in Ashland, Fruit Street in Westborough and Pine Street in Grafton) were identified in the Feasibility Study. The Fruit Street site in Westborough and the Howe Street station site in Ashland were not popular sites with nearby residents and generated much discussion during these early public coordination meetings.

At the outset of the schematic design phase, it became clear that some of the stations identified in the Feasibility Study would not survive the more detailed engineering evaluation and public review that is undertaken during the schematic design phase. Issues of adequate access, land availability, and track geometry were some of the obstacles that were identified during this early period of public participation. Therefore, the first element of the schematic design phase became the reevaluation of all potential sites along the entire rail corridor.

During the station site identification process, most of the communities along the rail corridor between Framingham and Worcester established special citizen committees to study the issue of siting a station in their town. The initial public participation process focused on meeting with these committees or Boards of Selectmen of the towns along the corridor to explain the site selection criteria and re-assessment of the station sites identified in the Feasibility Study.

The Westborough Advisory Committee was appointed in August of 1991 by the Westborough Selectmen in anticipation of the MBTA extension project.

The Westborough Advisory Committee met several times before the MBTA started the schematic design phase in January 1992. The committee meetings were videotaped and broadcast on the local public access cable TV channel. Many of the meetings also were reported by the local newspaper. The committee initiated its own station site selection process and investigated several sites in Westborough. The committee expressed a preference for the Smith Valve Parkway site.

The Ashland MBTA Rail Committee was appointed by the Ashland Selectmen on March 16,1992. The committee prepared a report for the Selectmen titled *"Should There be a Commuter Rail Station in Ashland?"*. The report evaluated nine potential sites and recommended a site on Pleasant Street.

The Millbury Committee was appointed by the Millbury Board of Selectmen on September 8, 1992.

The Southborough MBTA Study Committee was appointed by the Southborough Board of Selectmen in April,1992.

The Town of Grafton participated in this coordination process through its Board of Selectmen.

The City of Worcester coordinated with the MBTA through the Worcester Area Chamber of Commerce and the Mayor's Office of Planning and Community Development. The MBTA will continue coordination of commuter rail issues with the Worcester Redevelopment Authority and Worcester Regional Transit Authority, co-proponents of the Union Station restoration project which is undergoing a separate MEPA process.

Citizens Advisory Committee

Under the Certificate of the Secretary of Environmental Affairs Establishing a Special Procedure for a Major and Complicated Project, a Citizens Advisory Committee (CAC) was formed to assist the Secretary in review and evaluation of the environmental impacts of the project.

Members of the CAC included one representative from each of the local committees, plus two additional representatives from each community. In January 1993, the Secretary accepted a 28 member committee.

During the course of the environmental studies, the MBTA and its consultants met with the CAC, generally once a month, to discuss the project's progress and to allow the CAC to review preliminary environmental documents. These meetings usually were broadcast on the local public access cable TV channel and reported in various newspapers. The CAC also has visited each of the proposed station sites on a field trip sponsored by the MBTA. The minutes of CAC meetings are included in the Appendix, Volume II, Section 7.0.

Under the provisions of the Special Procedure, this Draft EIR was submitted to the CAC one month prior to submission to MEPA for notice in the Environmental

Monitor. Comments made by the CAC on the Draft EIR are included with the MEPA documents at the end of the Draft EIR.

1.6 Permits and Approvals

The MBTA has initiated project planning and conceptual design consistent with the requirements of the following environmental permits and approvals likely to be needed. Coordination between and among the MBTA, federal, state, and local agencies, and interested groups and individuals, will continue during the review of this Draft EIR, the development of the Final EIR, and thereafter through final design, permitting, and construction.

Section 404 Permit, Federal Clean Water Act

The project would require a section 404 permit for any fill contemplated in federally delineated wetlands. Since it is anticipated that the wetlands fill activities associated with the project will affect less than one acre, the project will likely have the benefit of the programmatic general permit administered by the U.S. Army Corps of Engineers. Based on preliminary analysis, it appears that the project may qualify as a non-reporting Category I activity under the programmatic general permit. In the event that the project does not meet the Category I thresholds, the MBTA would file an application with the Corps pursuant to Category II.

Section 401 (Water Quality Certification) Permit, Federal Clean Water Act

This permit is triggered by any permit required under the Federal Clean Water Act, e.g., the section 404 permit described above. DEP has the authority to issue water quality certification subject to the Massachusetts Water Quality Standards. DEP currently is in the process of consolidating its wetland protection programs in proposed regulations on water quality certification. Under the proposed regulations, federal and state wetlands will be considered cumulatively. As currently proposed, the project will fill less than 5,000 s.f. of bordering vegetated wetland, a key threshold for purposes of water quality certification. In the event that fill will exceed 5,000 s.f., the MBTA will analyze and consider alternatives commensurate with the project which minimize and mitigate individual and cumulative impacts and protect Outstanding Resource Waters. Generally, the project avoids or minimizes and mitigates, any adverse wetlands impacts and provides a minimum of 1:1 restoration or replication for any impacts. The project will limit activities near Outstanding

Resource Waters and adopt appropriate engineering and design solutions that ensure water supply protection.

Section 402 (National Pollution Discharge Elimination System) Permit, Federal Clean Water Act

Under Section 402(p) of the Federal Clean Water Act, stormwater discharges "associated with industrial activity," including construction activity disturbing more than five acres, must be authorized by an NPDES permit. It appears that the project is eligible for the general NPDES permit for construction. Since there is no reason to anticipate that any project related stormwater discharge will contribute to a violation of a water quality standard, an individual permit should not be required. The MBTA will prepare stormwater pollution prevention plans in accordance with the general permit requirements, including appropriate setbacks and other best management practices under the Massachusetts section 401 stormwater discharge certification for the general permit.

Orders of Conditions, Massachusetts Wetlands Protection Act

The MBTA will delineate relevant wetland resource boundaries pursuant to the recently proposed DEP amendments to the wetlands regulations which will require the analysis of hydrology and soils in addition to vegetation. The new DEP wetlands standards will facilitate the contemporaneous review of wetlands impacts under federal and state regulations. Any non-exempt activity that will alter a wetland resource area or be conducted in the 100-foot buffer zone will be presented to the local conservation commissions for review. Based on preliminary analysis and conceptual design development, the project will alter approximately 2,700± s.f. of bordering vegetated wetlands. The potential loss of groundwater recharge/discharge functions due to increased impervious areas would be minimal, particularly in terms of downstream water resources including water supply resources. The MBTA will develop a wetland compensation plan to fully offset the project's wetlands impacts.

SECTION 2.0 NEEDS ANALYSIS

The EOEA Scope for the DEIR posed the question, *"Commuter rail service was discontinued in 1975. What conditions have changed that would indicate that the re-establishment of service would be successful?"*

Section 1.2 of the EIR described the several contributing factors that led to the discontinuance of commuter rail service west of Framingham and reduction in service east of Framingham in 1975. Since that time, the MBTA has made substantial investments upgrading Framingham line tracks, train sets, stations, and service schedules. These investments have resulted in a significant increase in commuter rail patronage on the existing Framingham Line. In 1974, three inbound trains carried 630 passengers; by 1992, fifteen inbound trains were serving nearly 4,000 riders each weekday.

This Section of the DEIR describes the demographic changes that have occurred in the study area that lend support to re-establishment of commuter rail service west of Framingham. Re-establishment of commuter rail is related to evolving public policy concerning the Nation's transportation system and its impact on the economy and air quality. Implementation of commuter rail services must address the issue of practicality as well, by ensuring that there is sufficient demand for the service to justify the commitment of funds to provide the service.

2.1 Altered Public Policy on Transportation

Over the past decade, society's awareness of the consequences of ever increasing traffic congestion has resulted in significant changes in proposed solutions to transportation needs. As the nineteenth century witnessed explosive growth in the new technology of the railroad, so has the twentieth century been the golden age of the automobile and highway. The interstate highway construction program during the past 40 years greatly enhanced mobility; however, in urban and suburban areas, construction of new highways is now prohibitive in terms of costs and environmental consequences.

As the next century approaches, the focus of transportation policy has shifted towards extracting the most efficiency from the existing transportation network and providing a balanced transportation system. An average of 90 to 95% of all work trips in the commuter rail extension service area are made by automobile and most of these trips consist of driving alone. In 1990, public transportation accounted for a minor proportion of work trips in the service area. To a large extent this can be attributed to the lack of public transportation alternatives other than limited bus service.

Federal Clean Air Act Amendments (1990)

Over the past 25 years, air pollution emissions from individual automobiles have been significantly reduced; however, this reduction is beginning to be offset by the increased number of vehicles in use and the increased miles of travel.

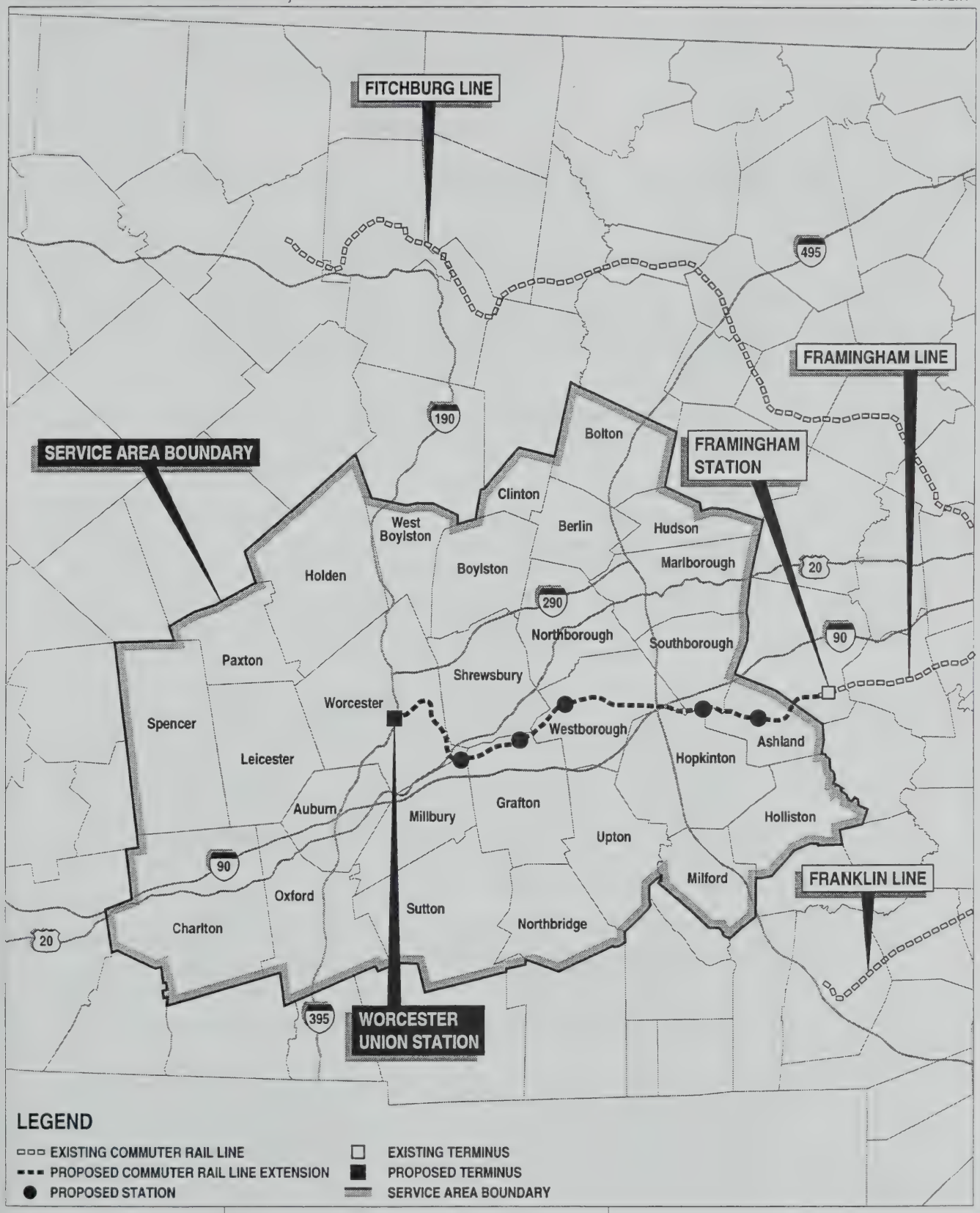
The Clean Air Act Amendments have established stringent requirements for attaining and maintaining national air quality standards. One of the methods of achieving these goals is to reduce the total vehicle miles of travel. Providing alternate modes of travel and promoting use of these modes can help to achieve that goal.

Federal Intermodal Surface Transportation Efficiency Act (1991)

This legislation, referred to as ISTEA, established a national goal of a balanced intermodal transportation system. The act requires coordinated transportation planning between regional planning organizations and state transportation agencies. ISTEA mandates that transportation improvements be consistent with and contribute to attaining national air quality standards.

2.2 Definition of Service Area

In evaluating the potential ridership for extension of commuter rail service from Framingham to Worcester, the Central Transportation Planning Staff (CTPS) employed certain criteria, such as comparative travel times and total travel costs associated with the transit and automobile modes, to determine a reasonable geographic service area. The contribution of commuter rail patronage from the individual twenty eight communities that constitute the defined service area (Figure 2.2-1) will vary depending on the number and location of new station stops; however, the service area boundary represents a practical geographic limit for primary commuter rail users. The CTPS criteria and methodology are described in more detail in Section 5.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 6 Miles

0 6

PROJECT SERVICE AREA

FIGURE 2.2-1

2.3 Demographics of the Service Area

The following pages provide tabular summaries of population, work force and journey to work data for the twenty eight communities that comprise the Worcester Commuter Rail Extension service area. The data, extracted primarily from the 1980 and 1990 U.S. Censuses, show demographic changes that lend support to extension of commuter rail.

Pertinent trends identifiable from comparing 1980 and 1990 data for the service area include the following:

- Population increased . . . . . 8% (Table 2.3-1)
- Workforce increased . . . . . 23% (Table 2.3-1)
- Employment increased . . . . . 15% (Table 2.3-2)
- Commuting to work out of town increased . . . . . 25% (Table 2.3-3)
- Work trips to Boston increased . . . . . 63% (Table 2.3-4)
- Work trips to Boston Proper increased . . . . . 72% (Table 2.3-4)
- Work trips to Cambridge increased . . . . . 151% (Table 2.3-4)

As these statistics indicate, the work force has increased at nearly twice the rate of growth in local employment and nearly three times as fast as population growth. The growth in work trips to Boston and Cambridge from the service area has been even more substantial. With highway access to Boston from the study area primarily via the Massachusetts Turnpike and Route 9, congestion and longer commuting times have already become a reality and are likely only to increase in the future. The statistics suggest the presence of a substantial pool of workers who would patronize commuter rail if it were available.

The proposed Worcester Commuter Rail Extension Project will restore rail commuter services between Boston and Worcester, Massachusetts's two largest cities. The operation of commuter trains from Framingham to Worcester will serve an area which has experienced substantial population growth and business development during the past thirty years.

Much of this growth was fueled by the construction of I-495, the outer circumferential highway for the Boston metropolitan area, and to a lesser extent, I-290, which links Worcester to the Massachusetts Turnpike (I-90) at Auburn and I-495 at Marlborough.

Demographic Trends

As shown in Table 2.3-1, population in the Worcester Commuter Rail Extension service area increased by 8 percent between 1980 and 1990.

Service area population estimates for the 1990 to 2000 decade, based on Metropolitan Area Planning Commission (MAPC) projections for MAPC municipalities and Massachusetts Institute for Social and Economic Research (MISER) projections for non-MAPC municipalities, show a modest 1 percent growth to 598,000. If Worcester, where MISER has projected a population loss of 11,000 by 2000, is excluded from the total, the projected growth for the remaining municipalities over the 1990 to 2000 decade is 4 percent.

Between 1980 and 1990, the resident work force in the service area increased by 23% (Table 2.3-1). Average annual employment in establishments covered by unemployment compensation laws increased by 15% for the period 1982 to 1991, according to Massachusetts Department of Employment and Training data (Table 2.3-2). While some individual towns have shown significant employment declines, the overall regional trend has been upward.

In the service area, growth in the work force over the 1980-1990 decade exceeded growth in both population and the general work force, leading to a corresponding shift in journey to work trends (Table 2.3-3). Over the decade, the number of workers commuting to a job located outside of the town of residence increased by 25%.

Of more importance in terms of commuter rail service is the significant growth in journey to work trips to Boston and Cambridge from the service area, as shown in Table 2.3-4. There are a substantial number of commuter work trips to Worcester as well (Table 2.3-5). These trips might support a "reverse commuter" service to Worcester. The outbound morning and inbound evening trains proposed in the Worcester Extension service could accommodate such riders.

In spite of the growth in the regional economic activities in the corridor between Worcester and Boston, Boston is still a major work destination for those living within the study area. Data compiled by the Central Massachusetts Regional Planning Commission reveal that the total work trips from Worcester County to the City of Boston increased from 2,660 in 1980 to 5,029 in 1990, an increase of 89 percent. This substantial increase is attributable to the rapid growth of eastern Worcester County, as well as the continuing search for housing which is more affordable than that found in the more expensive close-in suburbs between Boston and Route 128.

Commuting characteristics for workers living in the service area, as shown in Table 2.3-6, are as expected for a growing region not oriented to public transportation systems. With the exception of Worcester and Clinton, over 80 percent of the commuters in the various towns and cities drive to work alone by automobile. The use of public transportation is minimal, typically one percent or less of work trips, except in some of the towns closer to Boston and more accessible to public transportation. In Worcester, an urbanized area with its own bus system, public transportation usage is slightly higher at 4.5 percent. Outside of the more urbanized Worcester-Auburn area, typical mean travel time for commuters is in the 20 to 25 minute range, and in some instances approaches 30 minutes.

2.4 Purpose and Need

As discussed above, the Worcester Commuter Rail Extension Project has as its primary purpose the provision of an environmentally sound alternative to private automobile commuting from the growing employee concentrations between Worcester and Framingham to the growing employment opportunities in and near Downtown Boston. This purpose responds not only to the needs expressed in an evolving public policy on transportation, but also to the needs most recently articulated in the Clean Air Act Amendments of 1990 to make public transportation policy choices that reduce the emissions of air contaminants. Without this and similar projects, continued reliance on the private automobile will lead to increased traffic and reduced levels of service on the Massachusetts Turnpike, on the major parallel Commonwealth highways, and in Downtown Boston. These together would add to the emissions of air contaminants, reduce commuter mobility, and reduce employment choices, at least at the margin. As the Commonwealth moves into the 21st century, it is these growing environmental and transportation difficulties that must be resolved by the provisions of high quality, alternative transportation services such as the Worcester Commuter Rail Extension.

In addition to this primary purpose, elements of the project also help to satisfy other needs and to reduce other potential environmental effects. Chief among these collateral benefits is the incorporation of substantial improvements to the Commonwealth's rail freight system through track lowering, bridge replacements, and signal upgrades to allow for double-stacked container service as far east as Framingham. Finally, the project also will lead to general site and drainage

improvements all along the corridor, facilitating better protection of water resources through improved stormwater management using sensitive design and best management practices.

Table 2.3-1 Population and Labor Force Trends Worcester Commuter Rail Extension Service Area

City/Town	U.S. Census Data					
	Population			Resident Workers		
	1980	1990	Percent Increase 1980-1990	1980	1990	Percent Increase 1980-1990
Ashland	9,165	12,066	32%	4,682	7,058	51%
Auburn	14,845	15,005	1%	6,585	7,913	20%
Berlin	2,215	2,293	4%	1,066	1,282	20%
Bolton	2,530	3,134	24%	1,151	1,683	46%
Boylston	3,470	3,517	1%	1,627	1,789	10%
Charlton	6,719	9,576	43%	2,591	4,859	88%
Clinton	12,771	13,222	4%	5,265	6,722	28%
Grafton	11,238	13,035	16%	5,032	6,680	33%
Holden	13,336	14,628	10%	6,082	7,430	22%
Holliston	12,622	12,926	2%	5,755	7,044	22%
Hopkinton	7,114	9,191	29%	3,218	4,866	51%
Hudson	16,408	17,233	5%	8,067	9,602	19%
Leicester	9,446	10,191	8%	4,012	5,162	29%
Marlborough	30,617	31,813	4%	14,213	17,754	25%
Milford	23,390	25,355	8%	10,424	12,764	22%
Millbury	11,808	12,228	4%	5,037	6,277	25%
Northborough	10,568	11,929	13%	5,183	6,633	28%
Northbridge	12,246	13,371	9%	5,167	6,278	22%
Oxford	11,680	12,588	8%	4,819	6,176	28%
Paxton	3,762	4,047	8%	1,712	2,145	25%
Shrewsbury	22,674	24,146	6%	10,333	12,520	21%
Southborough	6,193	6,628	7%	2,741	3,563	30%
Spencer	10,774	11,645	8%	4,001	5,679	42%
Sutton	5,855	6,824	17%	2,311	3,496	51%
Upton	3,886	4,677	20%	1,691	2,470	46%
West Boylston	6,204	6,611	7%	2,888	2,950	2%
Westborough	13,619	14,133	4%	6,200	7,732	25%
Worcester	161,799	169,759	5%	64,557	73,981	15%
Total	**456,954**	**491,771**	**8%**	**196,410**	**242,508**	**23%**

Source: U.S. Census

Table 2.3-2 Employment Trends
Worcester Commuter Rail Extension Service Area

Average Annual Employment in Establishments Subject to Unemployment Compensation Laws			
City/Town	1982	1991	Percent Change 1982-1991
Ashland	3,596	3,865	7%
Auburn	5,882	8,169	28%
Berlin	252	360	30%
Bolton	982	1,453	32%
Boylston	960	1,263	24%
Charlton	876	1,321	34%
Clinton	5,116	4,483	-14%
Grafton	3,127	3,102	-1%
Holden	3,863	3,369	-15%
Holliston	3,161	3,939	20%
Hopkinton	1,914	3,734	49%
Hudson	6,265	7,887	21%
Leicester	1,148	1,223	6%
Marlborough	12,056	19,689	39%
Milford	7,876	10,338	24%
Millbury	2,196	3,302	33%
Northborough	2,832	5,701	50%
Northbridge	2,964	2,538	-17%
Oxford	1,226	2,078	41%
Paxton	675	564	-20%
Shrewsbury	6,479	9,939	35%
Southborough	3,290	4,009	18%
Spencer	2,056	2,947	30%
Sutton	1,223	1,187	-3%
Upton	587	873	33%
West Boylston	2,253	3,147	28%
Westborough	12,207	17,362	30%
Worcester	93,651	89,104	-5%
Total	**188,713**	**216,946**	**15%**

Source: Massachusetts Department of Employment and Training

Table 2.3-3 Journey-to-Work Trends
Worcester Commuter Rail Extension Service Area

Place of Residence	Place of Work			
City/Town	Out of Town		In Town	
	1980	1990	1980	1990
Ashland	4,653	5,911	473	1,147
Auburn	5,421	5,836	1,898	2,077
Berlin	934	1,078	184	204
Bolton	1,000	1,368	269	315
Boylston	1,000	1,504	269	285
Charlton	2,260	4,044	574	815
Clinton	2,883	4,426	2,933	2,296
Grafton	4,312	5,184	1,128	1,496
Holden	4,905	5,800	1,524	1,630
Holliston	5,213	5,840	1,090	1,204
Hopkinton	3,075	3,949	493	917
Hudson	5,310	6,709	3,297	2,893
Leicester	3,526	4,226	735	936
Marlborough	11,207	11,618	4,666	6,136
Milford	7,171	8,457	3,896	4,307
Millbury	4,540	4,937	989	1,340
Northborough	4,208	5,420	1,290	1,213
Northbridge	3,871	4,487	1,601	1,791
Oxford	4,372	5,131	732	1,045
Paxton	1,501	1,890	316	255
Shrewsbury	8,540	9,590	2,819	2,930
Southborough	2,374	2,844	583	719
Spencer	3,311	4,193	1,257	1,486
Sutton	1,944	2,996	479	500
Upton	1,461	2,099	311	371
West Boylston	2,312	2,302	707	648
Westborough	4,799	5,449	2,374	2,283
Worcester	13,608	22,570	55,281	51,411
Total	**119,711**	**149,858**	**92,168**	**92,650**
Percent Increase, 1980-1990		*25%*		*1%*

Source: U.S. Census

Table 2.3-4 Work Trips to Boston and Cambridge Trends Worcester Commuter Rail Extension Service Area

Place of Residence	Place of Work					
City/Town	Boston		Boston Proper		Cambridge	
	1980	1990	1980	1990	1980	1990
Ashland	235	810	102	482	40	195
Auburn	47	78	28	47	0	30
Berlin	36	29	17	9	4	17
Bolton	38	82	27	37	34	32
Boylston	22	15	13	0	0	0
Charlton	22	9	13	0	0	7
Clinton	59	120	39	78	0	10
Grafton	26	90	15	46	27	67
Holden	26	132	15	62	0	14
Holliston	381	653	246	356	114	97
Hopkinton	232	295	107	179	44	91
Hudson	167	269	89	113	14	122
Leicester	0	5	0	5	11	11
Marlborough	457	702	216	360	125	191
Milford	417	714	191	434	52	117
Millbury	23	48	13	42	23	31
Northborough	156	217	75	121	41	41
Northbridge	23	86	10	32	0	9
Oxford	0	27	0	27	0	22
Paxton	0	21	0	8	0	11
Shrewsbury	194	235	117	132	0	80
Southborough	286	285	130	161	32	79
Spencer	0	21	0	6	0	0
Sutton	14	29	9	0	14	0
Upton	35	161	14	128	0	37
West Boylston	12	38	7	25	0	23
Westborough	356	305	178	117	37	132
Worcester	492	629	295	378	23	126
Total	**3,756**	**6,105**	**1,966**	**3,385**	**635**	**1,592**
Percent Increase, 1980-1990		*63%*		*72%*		*151%*

Source: U.S. Census

Table 2.3-5 Work Trips to Worcester

Municipalities in the Boston Region*
with more than 50 people who commute to Worcester to work.

City/Town	Work Trips to Worcester
Acton	104
Ashland	76
Bellingham	72
Belmont	56
Bolton	65
Boston	270
Brookline	52
Cambridge	61
Framingham	449
Franklin	108
Holliston	82
Hopkinton	82
Hudson	220
Marlborough	453
Milford	284
Natick	128
Newton	182
Somerville	51
Southborough	113
Sudbury	61
Watertown	54
Subtotal	3,023
All other municipalities in Boston Region	884
Total	3,907

* *The Boston Region is defined as the cities and towns that make up the Metropolitan Area Planning Council (MAPC) region.*

Table 2.3-6 Work Trips by Mode of Travel - 1990
Worcester Commuter Rail Extension Service Area

City/Town	Distribution of Trips by Mode of Travel					Mean Travel Time (minutes)
	% Drive Alone	% Car Pools	% Public Transport-ation	% Other	% Walked or at Home	
Ashland	83.6	8.0	3.2	0.6	4.6	27.0
Auburn	86.2	8.7	0.7	0.3	4.2	18.6
Berlin	82.8	8.6	0.2	0.5	7.4	22.8
Bolton	81.5	7.1	2.3	0.8	8.3	26.0
Boylston	87.9	7.2	0.7	0.4	3.9	19.9
Charlton	84.4	11.1	0.1	0.6	3.8	24.4
Clinton	78.0	14.2	0.5	0.8	6.5	21.6
Grafton	86.1	8.6	0.3	0.5	4.5	23.1
Holden	87.6	7.6	0.5	0.5	3.7	21.2
Holliston	84.2	8.7	2.4	0.2	4.4	28.8
Hopkinton	83.9	8.3	0.9	0.6	6.2	25.4
Hudson	82.9	12.0	0.6	0.7	3.8	23.1
Leicester	83.0	11.1	1.1	0.0	4.8	22.2
Marlborough	82.6	12.5	0.7	0.7	3.5	22.3
Milford	81.0	12.0	1.1	0.3	5.6	25.2
Millbury	82.8	12.3	0.5	0.2	4.1	19.1
Northborough	85.3	9.3	0.6	0.2	4.6	22.7
Northbridge	80.5	13.3	0.2	1.1	4.8	24.1
Oxford	83.2	11.1	0.5	1.2	3.9	21.7
Paxton	82.8	10.0	0.0	0.0	7.3	25.0
Shrewsbury	87.7	7.2	0.6	0.5	4.0	20.2
Southborough	84.1	6.2	1.0	0.8	7.9	23.3
Spencer	81.4	12.7	1.1	1.3	3.5	25.7
Sutton	87.0	7.7	0.0	0.6	4.8	23.1
Upton	85.8	7.3	1.1	0.2	5.6	26.0
West Boylston	83.3	9.1	0.8	0.8	6.1	22.0
Westborough	87.4	7.3	0.7	0.2	4.3	22.7
Worcester	71.0	13.2	4.5	0.9	10.4	18.3

Source: U.S. Census

SECTION 3.0 PROJECT ELEMENTS

This section provides a detailed description of the various project elements related to restoration of commuter rail service to Worcester, including rail corridor improvements, commuter rail stations and associated parking, and layover facility. Train schedule and fare data, implementation schedule, operating cost/revenue, construction costs and MBTA mitigation policy on environmental impacts are also included.

3.1 Railroad Right-of-Way

The extension of MBTA commuter rail service from Framingham to Worcester will operate over trackage owned and maintained by Conrail. The MBTA will execute an operating agreement with Conrail for use of the tracks for commuter rail purposes. The corridor from Boston to Worcester will continue to serve freight needs as well as passenger service by Amtrak and MBTA. Present service between South Station and Framingham is over tracks owned by the MBTA.

Most of the existing mainline between Boston and Worcester currently is double tracked with continuous welded rail. The seven mile section between milepost (MP) 33 and MP 40.3 currently is single tracked. The eastbound track in this section was removed by Conrail in 1985, but the track roadbed remains generally wide enough to accommodate replacement of the second track. This second track will be restored as part of this project to accommodate safe, efficient operations of the additional commuter rail trains. The eastbound track between MP 40.3 and MP 43 currently is used by Conrail as a siding. This section of track is in poor condition and would be rehabilitated, including installation of new continuous welded rail, as part of this project.

Additional track work will be undertaken to improve track geometrics to permit 70 mph operations for Amtrak and MBTA trains. Rail corridor improvements also will include upgrading of communication signals, switching, installation of additional cross-overs in the vicinity of proposed stations, and related improvements necessary

to accommodate commuter rail service. In the vicinity of station sites, track center-to-center distance will be increased to 14'-0", and fencing between inbound and outbound tracks will be installed to discourage pedestrian crossings. In other areas identified as critical to safety and security, new fencing will also be installed at right-of-way edges, as well.

In conjunction with EOTC objectives of improving clearances on this line, track work and/or bridge alterations will be made to provide a through vertical clearance of 21 feet. Improved vertical clearance is not essential for restoration of commuter rail service; however, because of the potential for disruption of train schedules resulting from future track work to achieve the desired clearances and the additional cost of reconstructing wayside improvements installed for commuter rail operations, the proposed rail corridor upgrading will include any necessary track reconstruction to achieve a 21 foot vertical clearance between Worcester and Framingham. It is expected that the costs of the additional construction will be subsidized by EOTC.

Overhead bridges with existing clearances less than required are shown in Table 3.1-1, with proposed conceptual design solution for improving each clearance.

Two of the existing structures with deficient clearances—High Street in Ashland and Hamilton Street in Worcester—currently are programmed for replacement under the Massachusetts Highway Department's ongoing program for replacement of functionally obsolete and structurally deficient bridges. Construction work on these two bridges is expected to commence in 1994. The Fountain Street bridge in Framingham also is programmed for replacement by the MHD, but is in the early design stage.

The Pine Street bridge in Grafton also is eligible for replacement under the MHD program. Through interagency coordination, the MHD has agreed to schedule design and construction of the Pine Street bridge to be compatible with the commuter rail extension project.

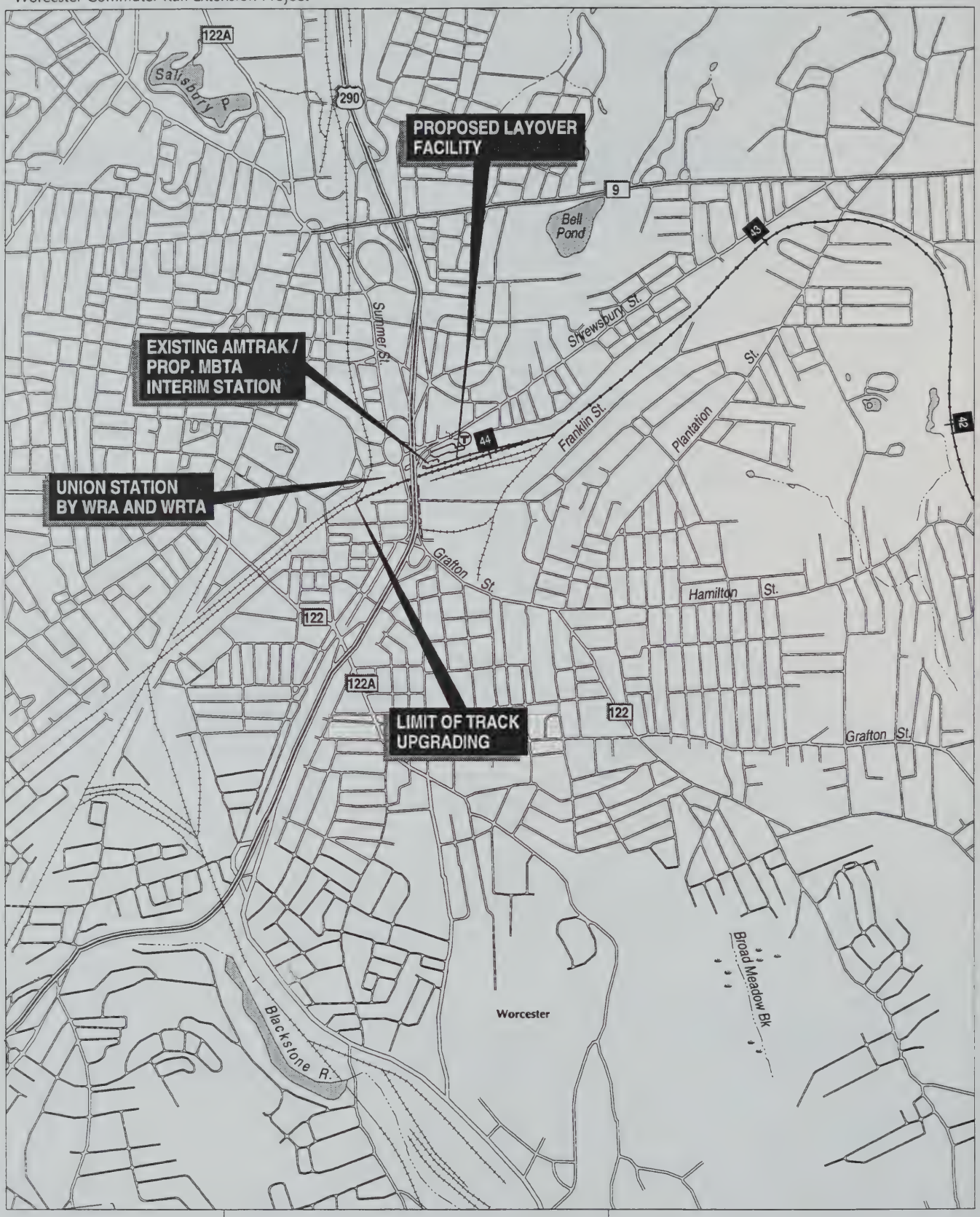
The railroad corridor is depicted on Figure 3.1-1 Panels 1 through 8 along with the location of all improvements. Potential impacts of these railroad corridor improvements are described in Section 7.

Table 3.1-1 Proposed Railroad Vertical Clearance Improvements

Town	Overhead Bridge	Milepost	Work Required for 21'-0" Vertical Clearance
Worcester	Hamilton Street	41.67	Construct New Bridge*
Grafton	Cross Street	38.00	Lower Tracks 12"
	Pine Street	36.40	Construct New Bridge*
Westborough	Fisher Street	34.04	Bridge removal by MHD
	Milk Street	32.71	Lower Tracks 8"
	Fruit Street	28.92	Lower Tracks 8"**
Southborough	Bridge Street	28.02	Lower Tracks 10"**
Ashland	Howe Street	26.08	Lower Tracks 10"
	High Street	25.25	Construct New Bridge*
	Fountain Street	23.67	Lower Tracks 16"**
Framingham	Winter Street	22.35	Lower Tracks 12"**
	Fountain Street	21.84	Construct New Bridge*

* *Functionally obsolete and structurally deficient bridges scheduled for reconstruction under Massachusetts Highway Department Bridge Replacement and Rehabilitation Program.*

** *Table shows required track lowering; however these bridges may be replaced by MHD.*



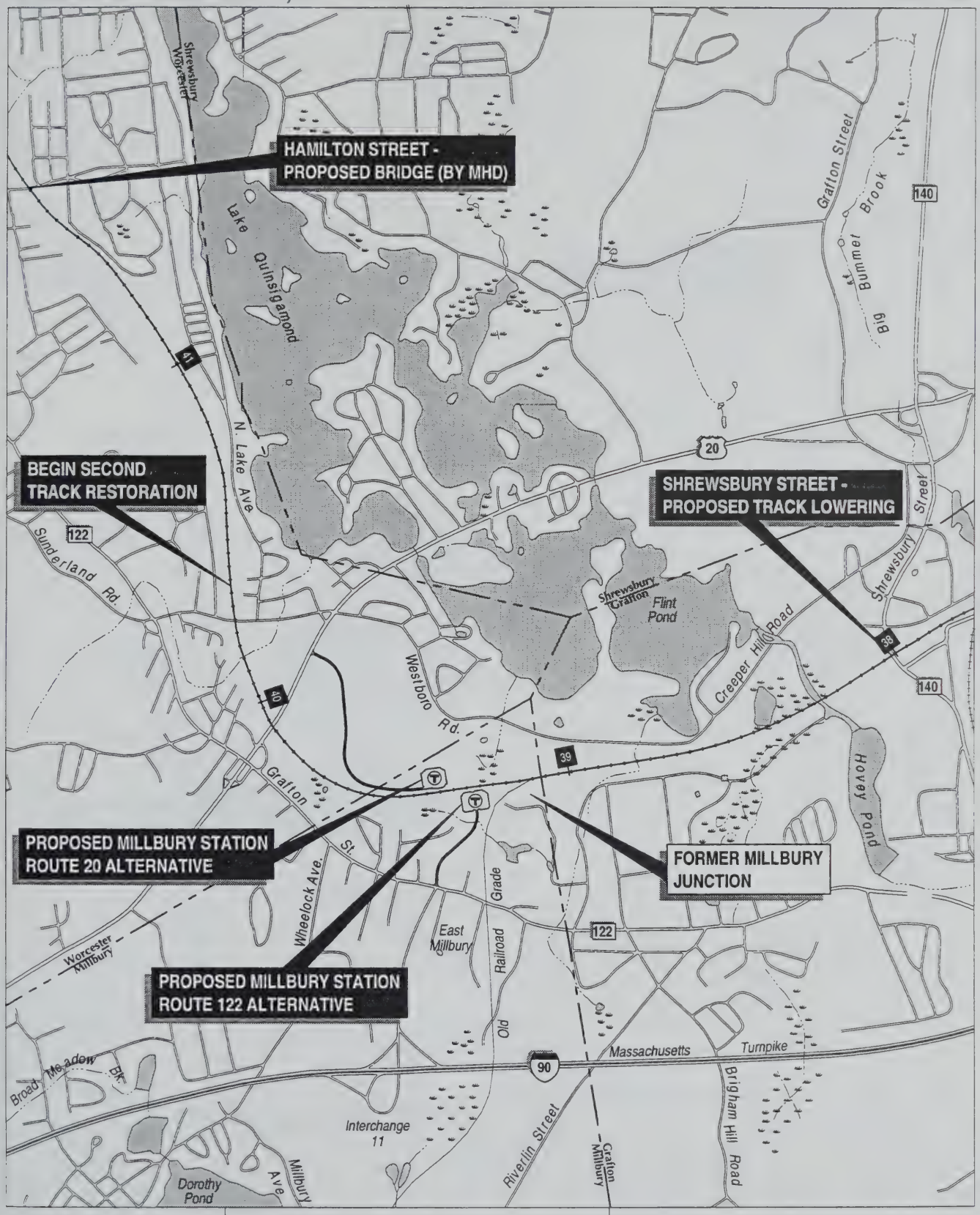
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

0 2000

PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 1 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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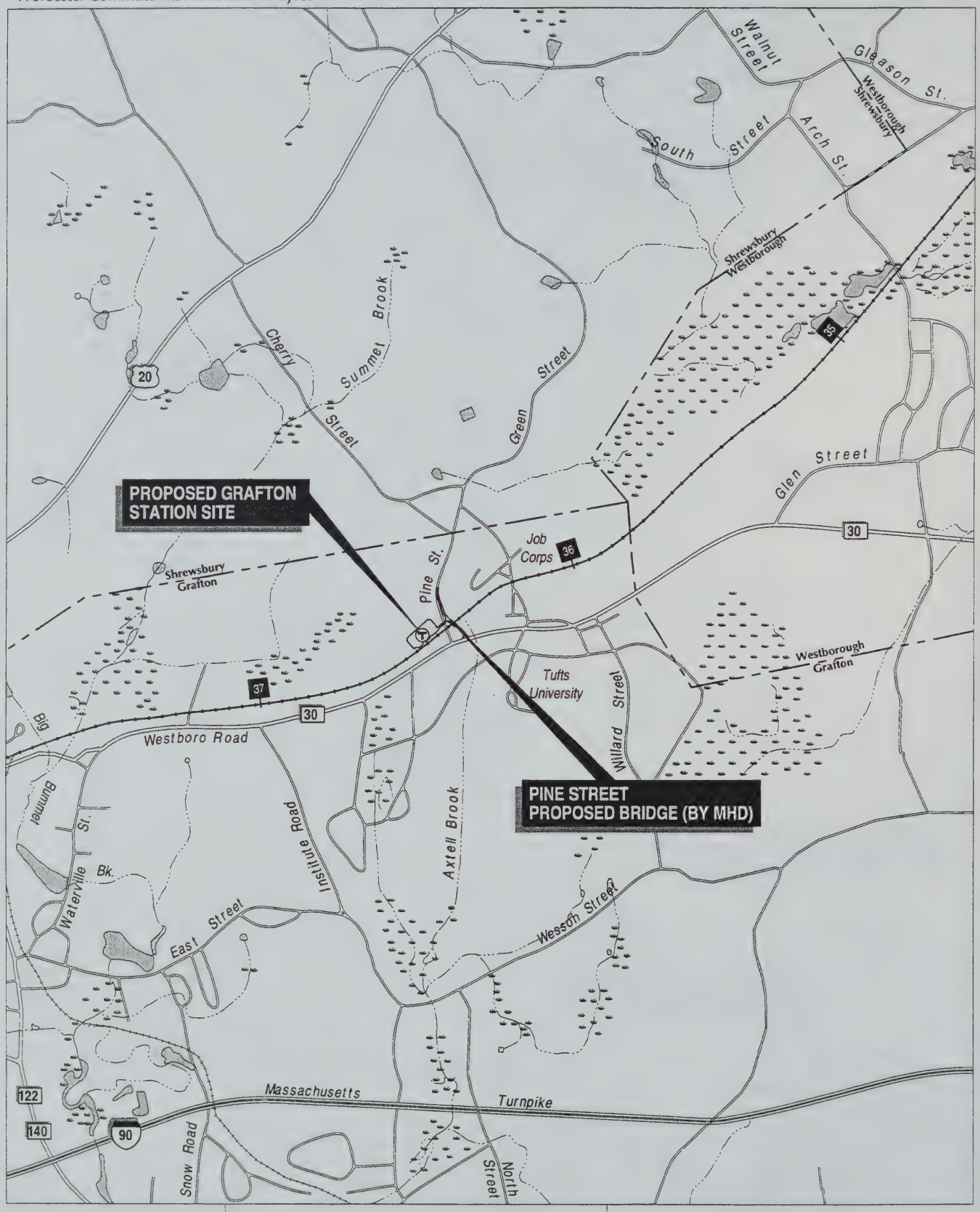
PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 2 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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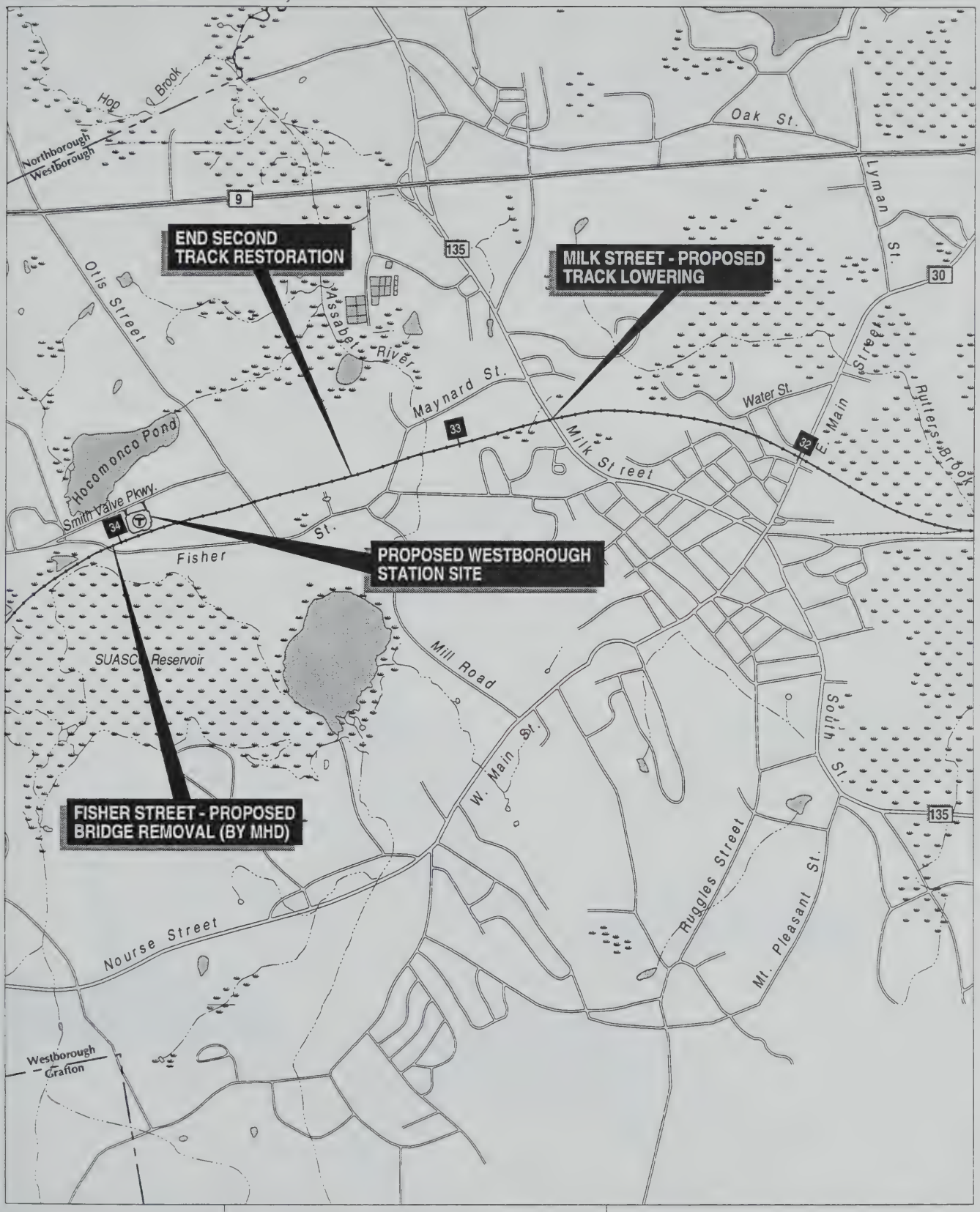
PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 3 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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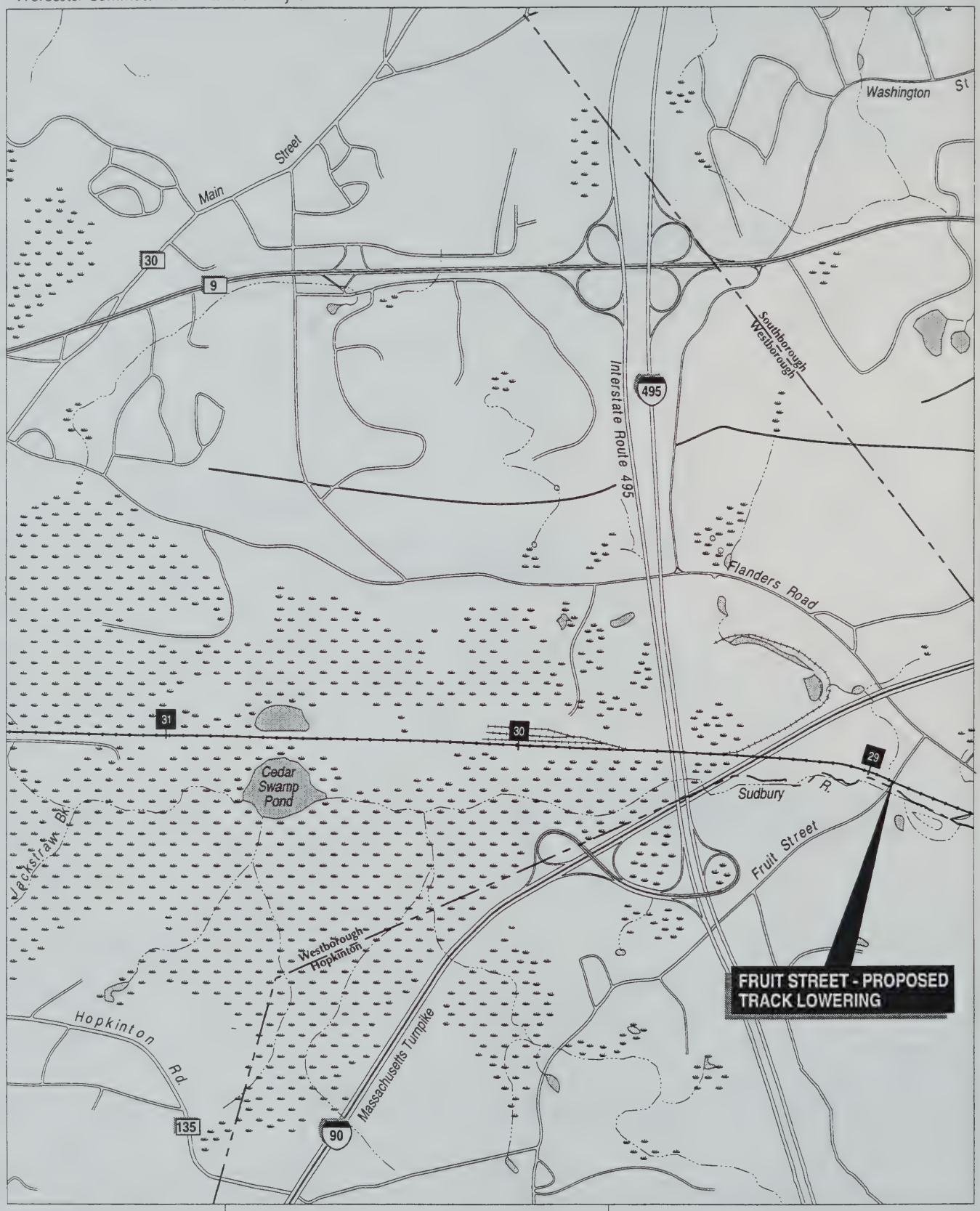
PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 4 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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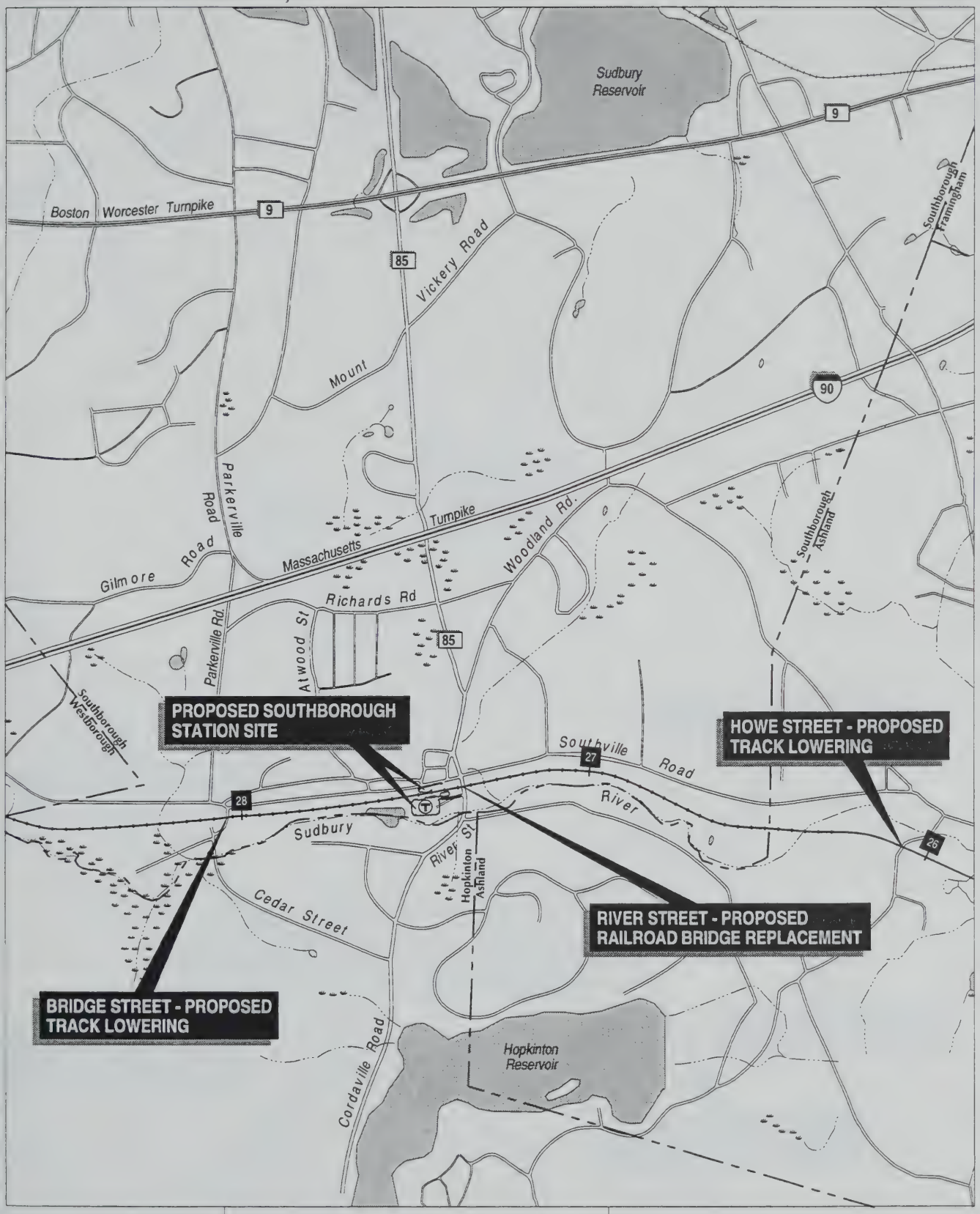
PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 5 OF 8



MATCH LINE - SEE PANEL 5 OF 8

MATCH LINE - SEE PANEL 7 OF 8

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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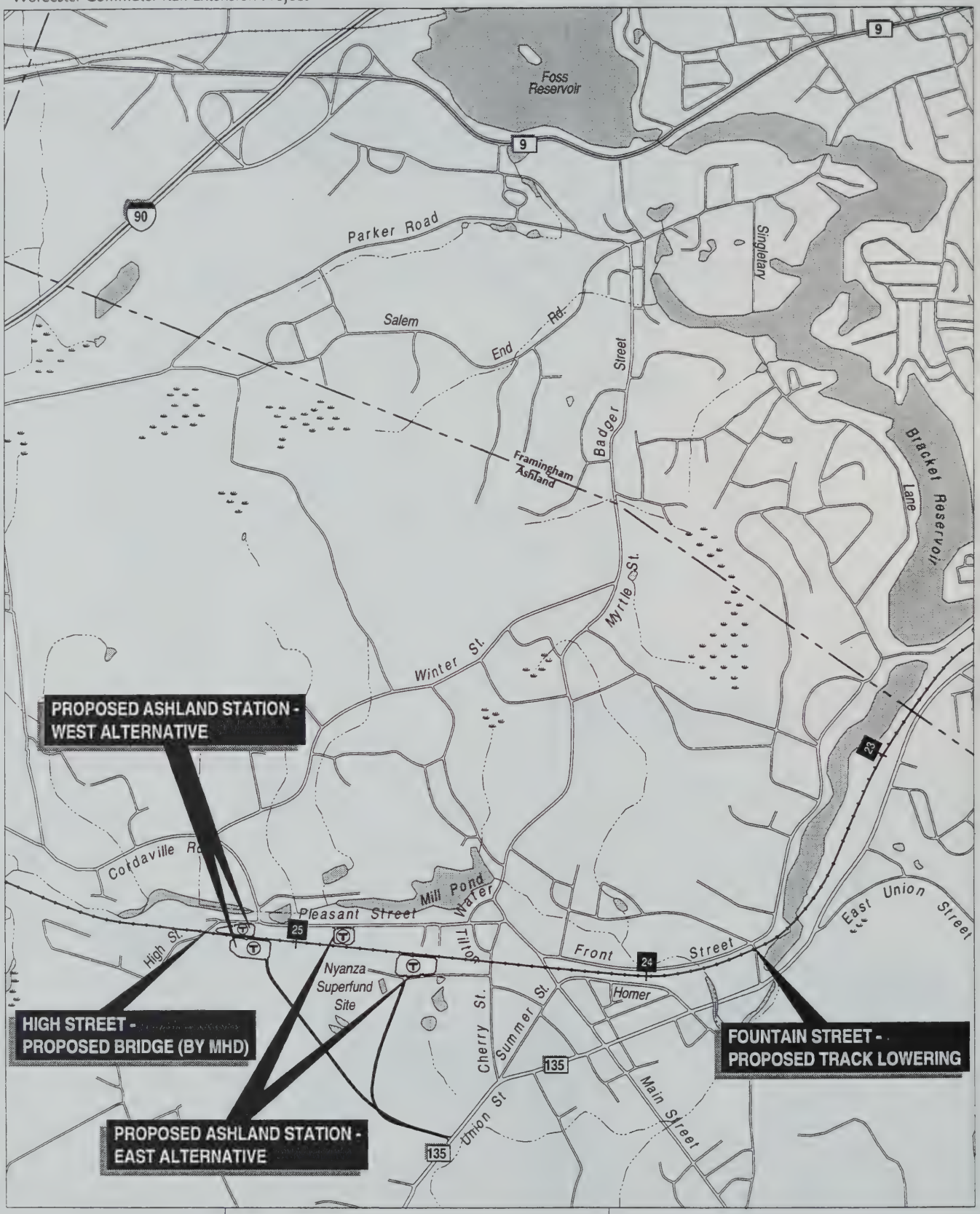
PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 6 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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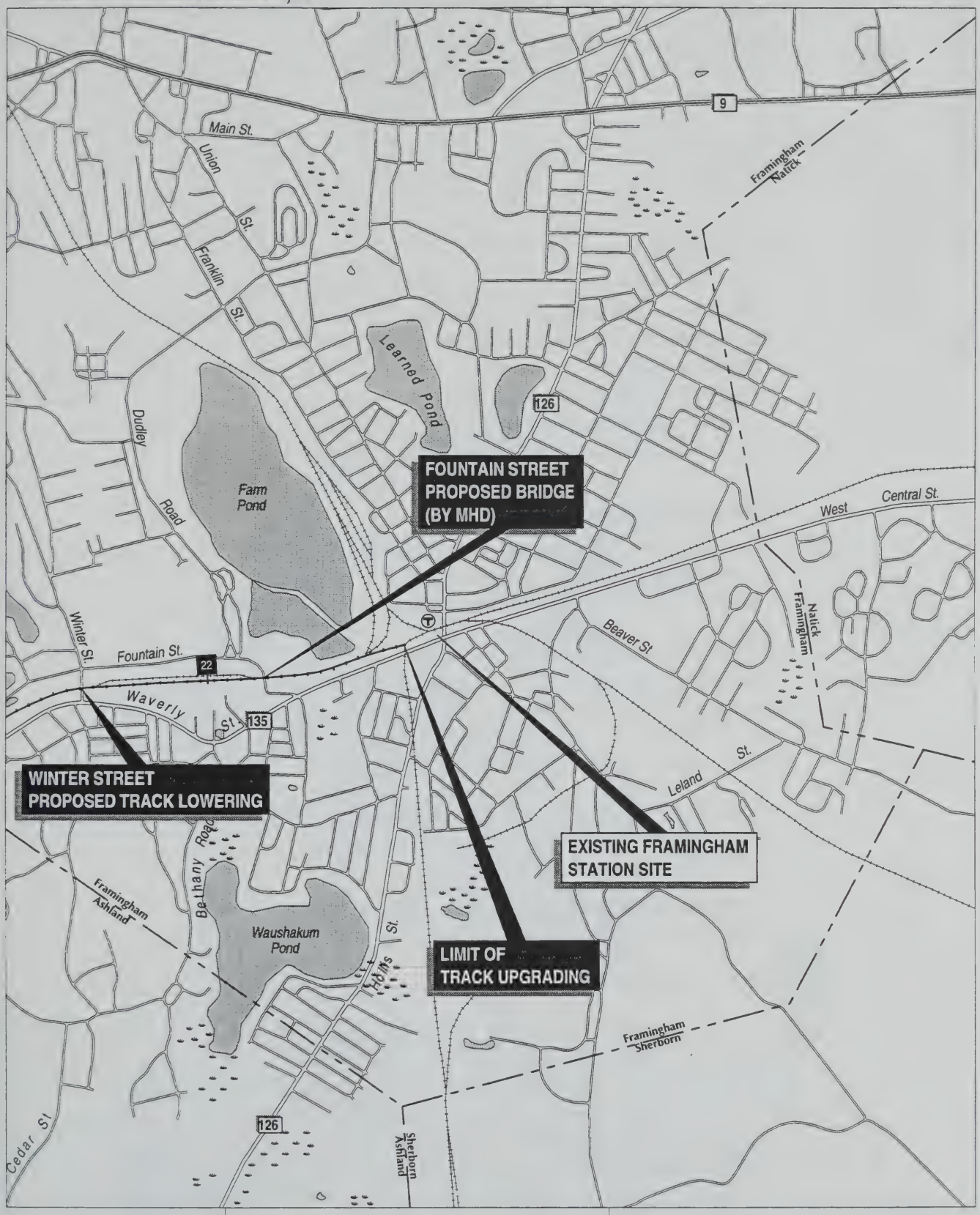
PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 7 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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PROPOSED RAILROAD CORRIDOR IMPROVEMENTS

FIGURE 3.1-1 PANEL 8 OF 8

3.2 Stations

Worcester Terminus (Union Station)

Ultimately, the Worcester service will terminate at Union Station in downtown Worcester. As discussed in preceding Section 1.4, the presently vacant station is in the process of being restored to serve as an Intermodal Transportation Center. Opening is projected for November, 1997. The MBTA will continue coordination with the Worcester Regional Transit Authority and Worcester Redevelopment Authority concerning commuter rail operational needs. (Union Station is being reviewed by MEPA as a separate independent project, EOEA #9521.)

Worcester Interim Station

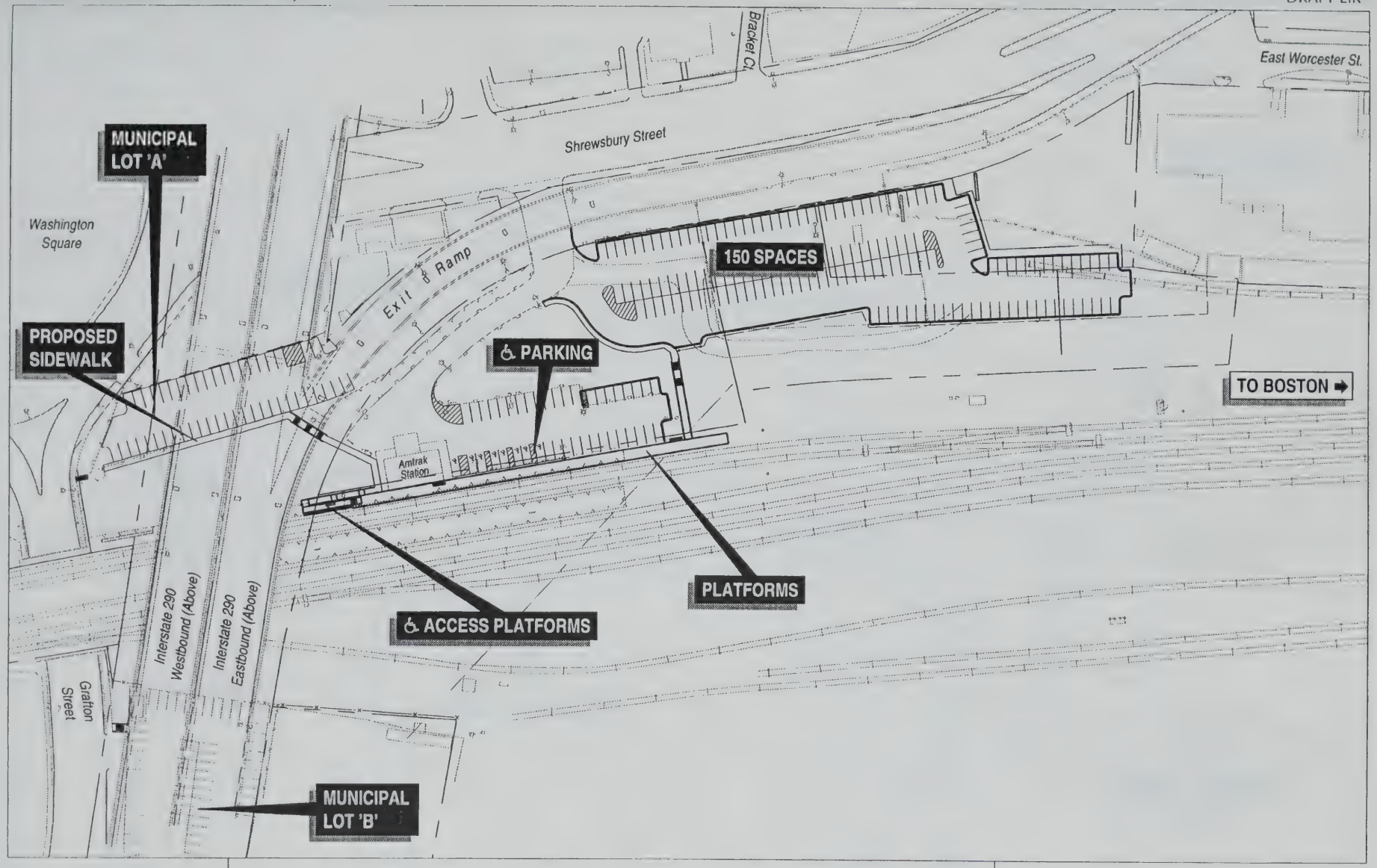
In January, 1994, the Secretary of Environmental Affairs issued a certificate allowing the MBTA to proceed with Interim Service to Worcester. A key element to this service is the construction and operation of a Worcester Interim Station.

The proposed Interim Station, scheduled for initiation in October 1994, is a modification and expansion of the existing Amtrak Station. The site is located near Downtown Worcester, north of the railroad tracks, south of Shrewsbury Street and just east of Interstate Route 290. The site lies approximately 700 feet east of Union Station. Design elements of the Interim Station include:

- Reconstruction of the existing station platform
- Construction of a new handicapped access platform
- Construction of a new parking lot
- Reconstruction of the site lighting system
- Sidewalks and stairways for platform access
- Various station amenities (signing, benches, fencing, landscaping, etc.)

Details of the proposed Interim station are shown on Figure 3.2-1.

The proposed parking supply at the Interim Station will be approximately 150 spaces. In order to accommodate projected parking demands (290 spaces by year 1996 and 350 spaces by year 2011), the MBTA currently is negotiating with state and city officials to use up to 200 additional parking spaces in portions of municipal lots located under Route I-290 (see Figure 3.2-2). As part of the proposal, the MBTA will construct capital improvements, consisting of pavement overlay, signing, striping, and new lighting, at those municipal lots.



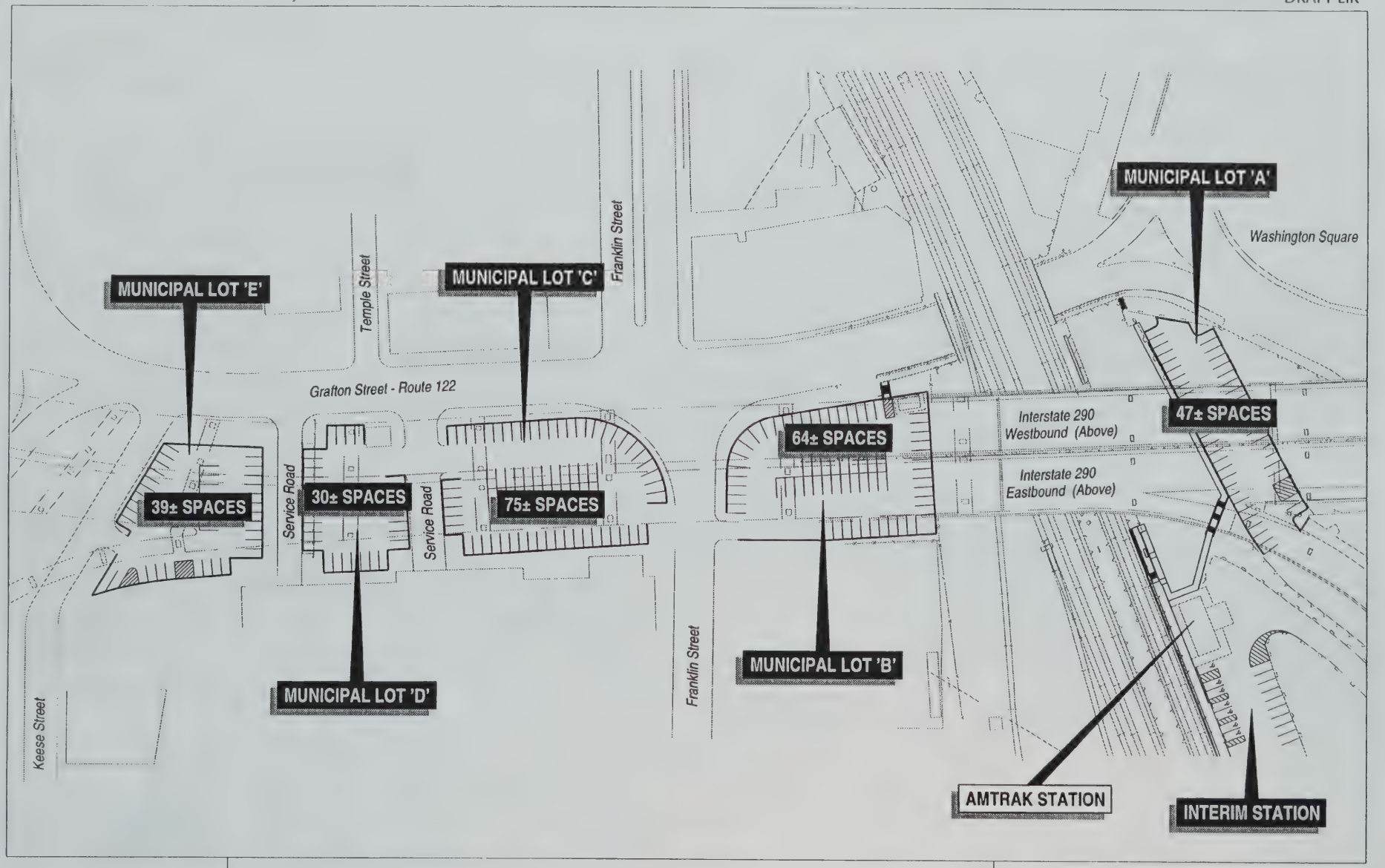
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125

0 125

SITE PLAN - INTERIM STATION WORCESTER, MA

FIGURE 3.2-1



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'

0 125

SITE PLAN - MUNICIPAL LOTS
WORCESTER, MA

FIGURE 3.2-2

Upon completion of the Union Station project, it is anticipated that the Worcester commuter rail and Amtrak services will be relocated from the Interim Station to Union Station. All parking and related elements constructed for the Interim Station will remain and will continue servicing those commuter rail passengers destined to use Union Station.

Potential impacts of the Interim Station are described in Section 10.

Intermediate Stations

The proposed project evaluated construction of intermediate stations in each of the five towns traversed by the commuter rail extension as well as options for a regional station at the I-495 crossing of the rail corridor. Stations are proposed for Millbury (two alternatives) Grafton, Westborough, Southborough and Ashland (two alternatives). Intermediate station location, size, and design have been developed in coordination with local community officials and/or designated town rail committees. Construction of the regional station as described in Section 17, is not included in the current project.

The five intermediate station sites were selected after a review of the entire rail corridor and specific analysis of many potential sites. The initial sites evaluated included the station stops identified in the 1990 Feasibility Study and the original station stops that once served this corridor. The site selection process, criteria, and sites evaluated are described in Section 11.

The MBTA policy on intermediate stations is that an individual station will not be constructed unless it is acceptable to the local community. At the time of preparation of the Draft EIR, it cannot be stated with certainty which stations will or will not be constructed although the MBTA would be pleased to construct all five.

The specific details of each station site are described on the following pages. These stations have basic common design parameters as described below.

Generic Station Details

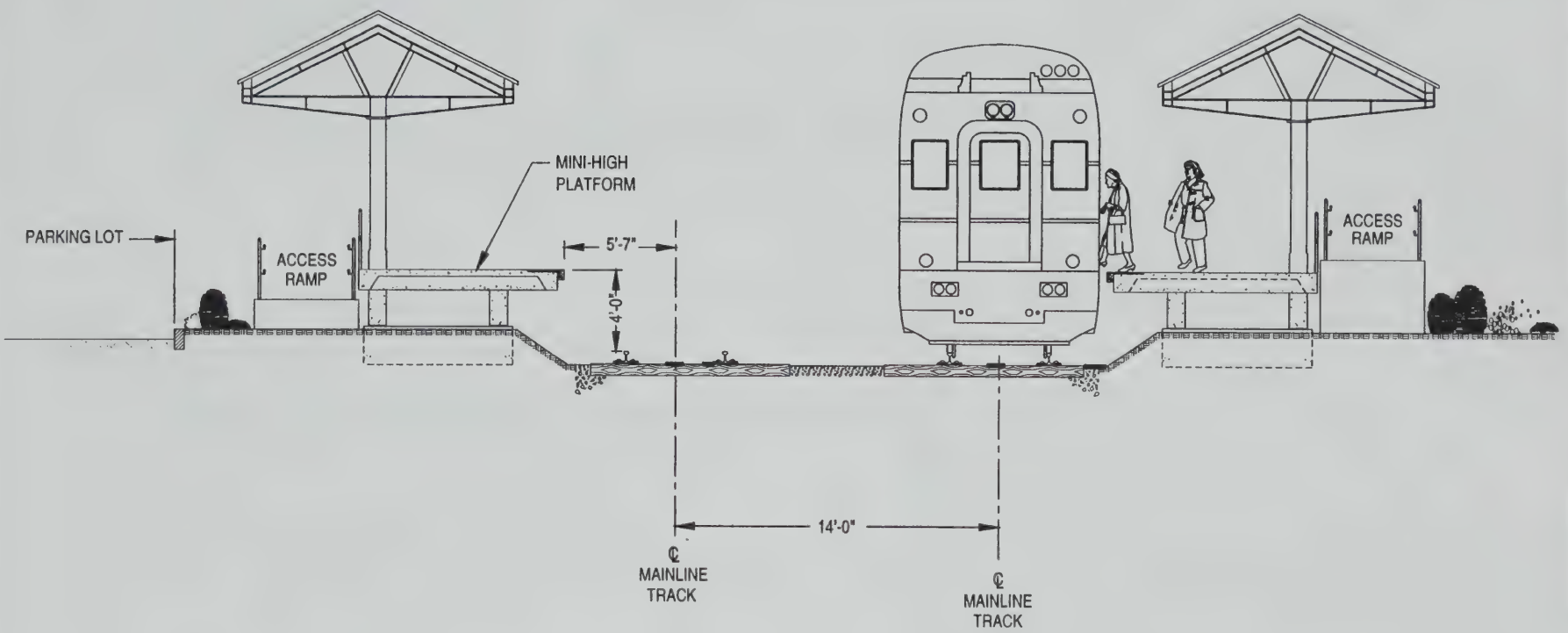
Each commuter rail station will provide a separate boarding platform for inbound and outbound travel. Station platforms will be low level, 800 feet in length, with a 45 foot long raised platform accessible to the disabled. Canopies and wind break screening will be provided along the access platform and at intervals along the low level platform. Parking lots will be constructed at each station, with the lot size being dependent on projected demand and availability of sufficient land for construction. In addition, each station will include lighting, landscaping, benches, and bicycle

racks. Facilities will be provided to allow for installation of telephones and newspaper vending machines.

Fencing will be installed between the inbound and outbound tracks through the station area to discourage pedestrian crossing. Grade separated track crossing will be provided by construction of an overhead pedestrian bridge with ramps and stairways. Where site conditions favored an undertrack crossing, that option was investigated.

The stations will be accessible to the disabled. The parking lot will provide for reserved spaces for the disabled. The pedestrian overpass structure will include both ramps and stairs, and the passenger platforms will include a section of raised platform, with ramps, to allow the disabled access to the rail coaches.

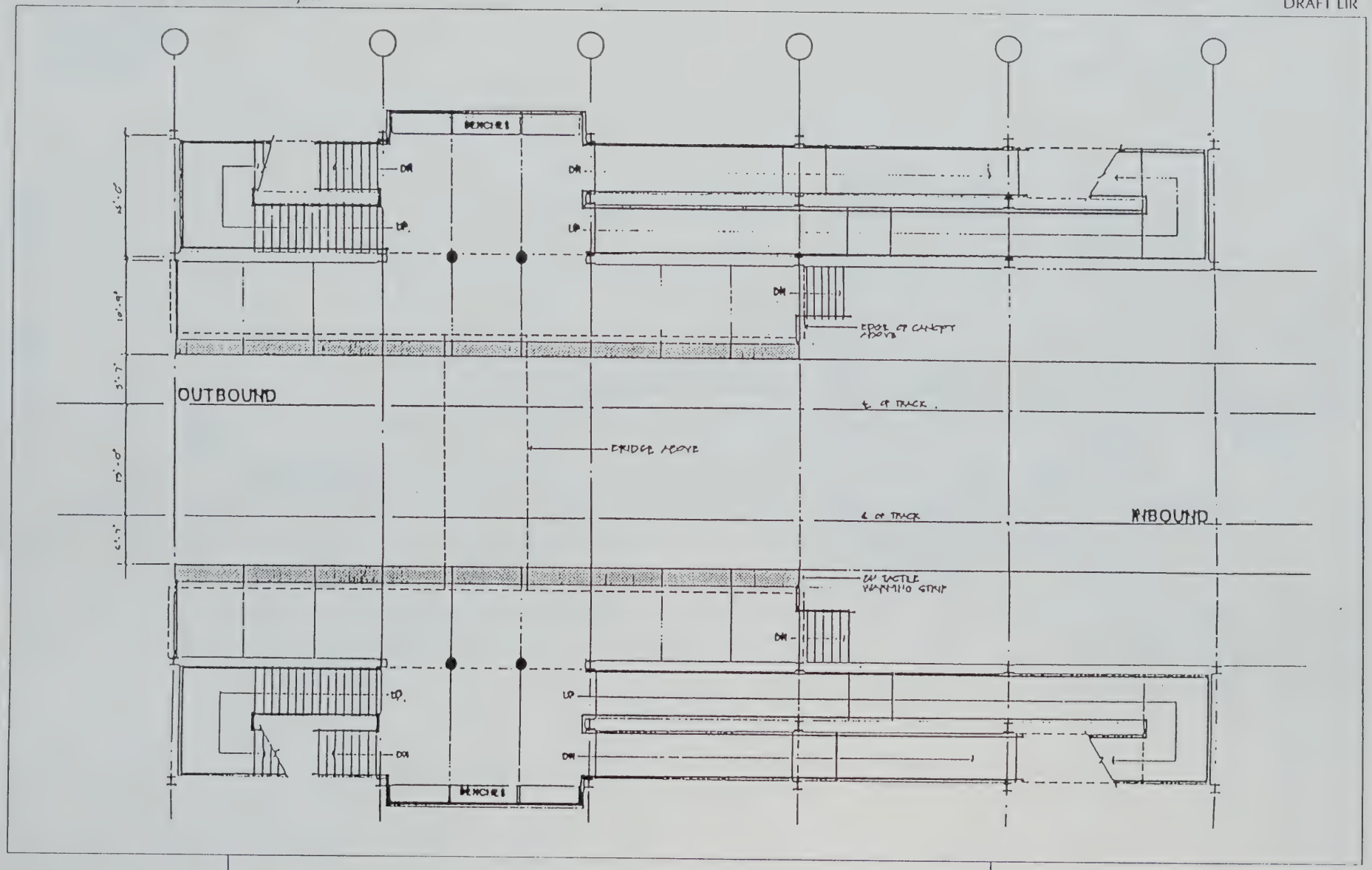
Typical station elements, shown on Figures 3.2-3 through 3.2-5, depict mini-high platform and pedestrian bridge details.



Massachusetts Bay Transportation Authority

TYPICAL SECTION - MINI-HIGH PLATFORM

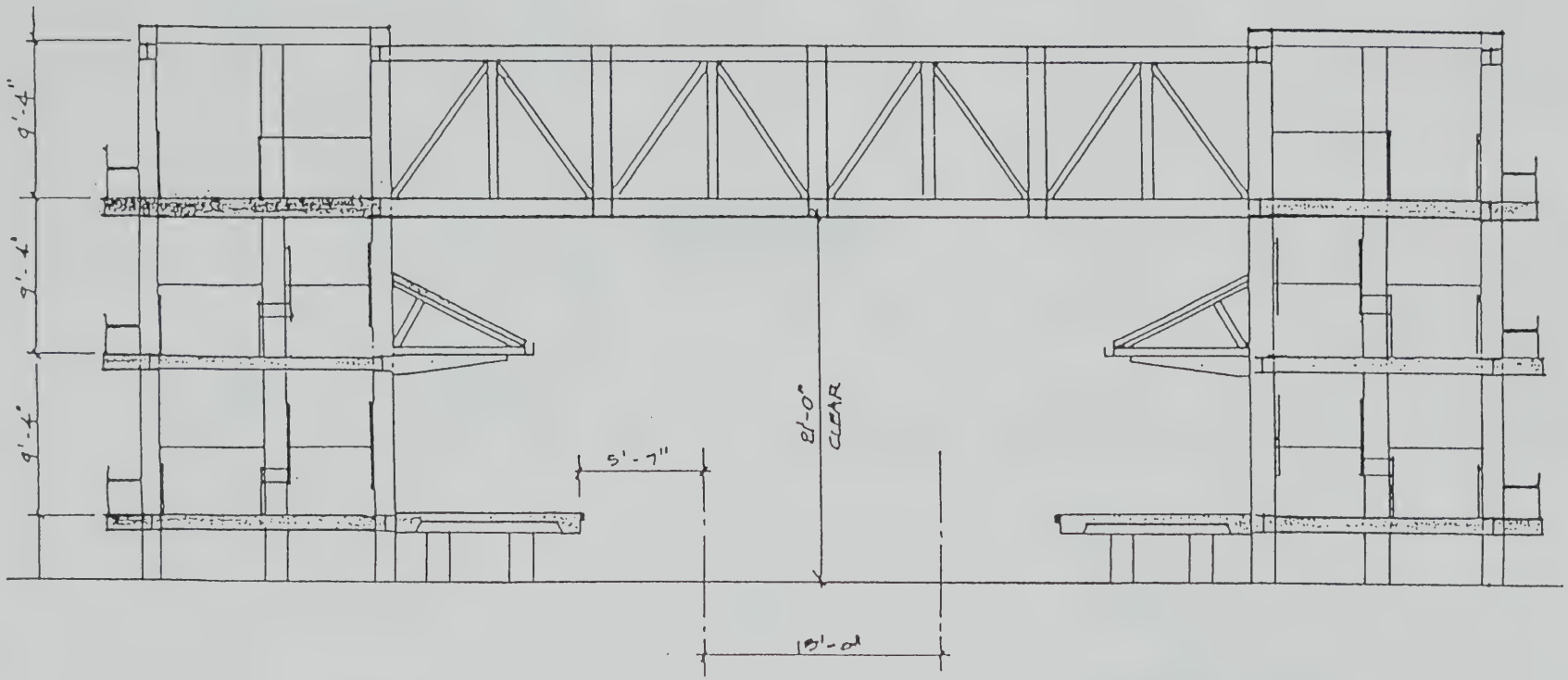
FIGURE 3.2-3



Massachusetts Bay Transportation Authority

PLAN - RAMP AND PEDESTRIAN BRIDGE

FIGURE 3.2-4



Massachusetts Bay Transportation Authority

ELEVATION - RAMP AND PEDESTRIAN BRIDGE

FIGURE 3.2-5

Millbury Station

Two alternative station sites are being evaluated for the proposed commuter rail station in Millbury. One alternative would be accessed from Route 122 in East Millbury, opposite the ramp terminus from the Massachusetts Turnpike at Exit 11. The alternative station site would be accessed from Route 20 in Worcester (see Figure 3.1-1, Panel 2 of 8, on page 3-5, and Figure 3.2-6).

The site accessed from Route 122 lies in a somewhat secluded area south of the tracks immediately west of the former Millbury Junction. Approximately one half of the site is vegetated with various trees and shrubs, while the remaining area is generally open space consisting of grasses and gravel footpaths. The site slopes generally in a southerly direction and is drained by a small stream located just south of the site.

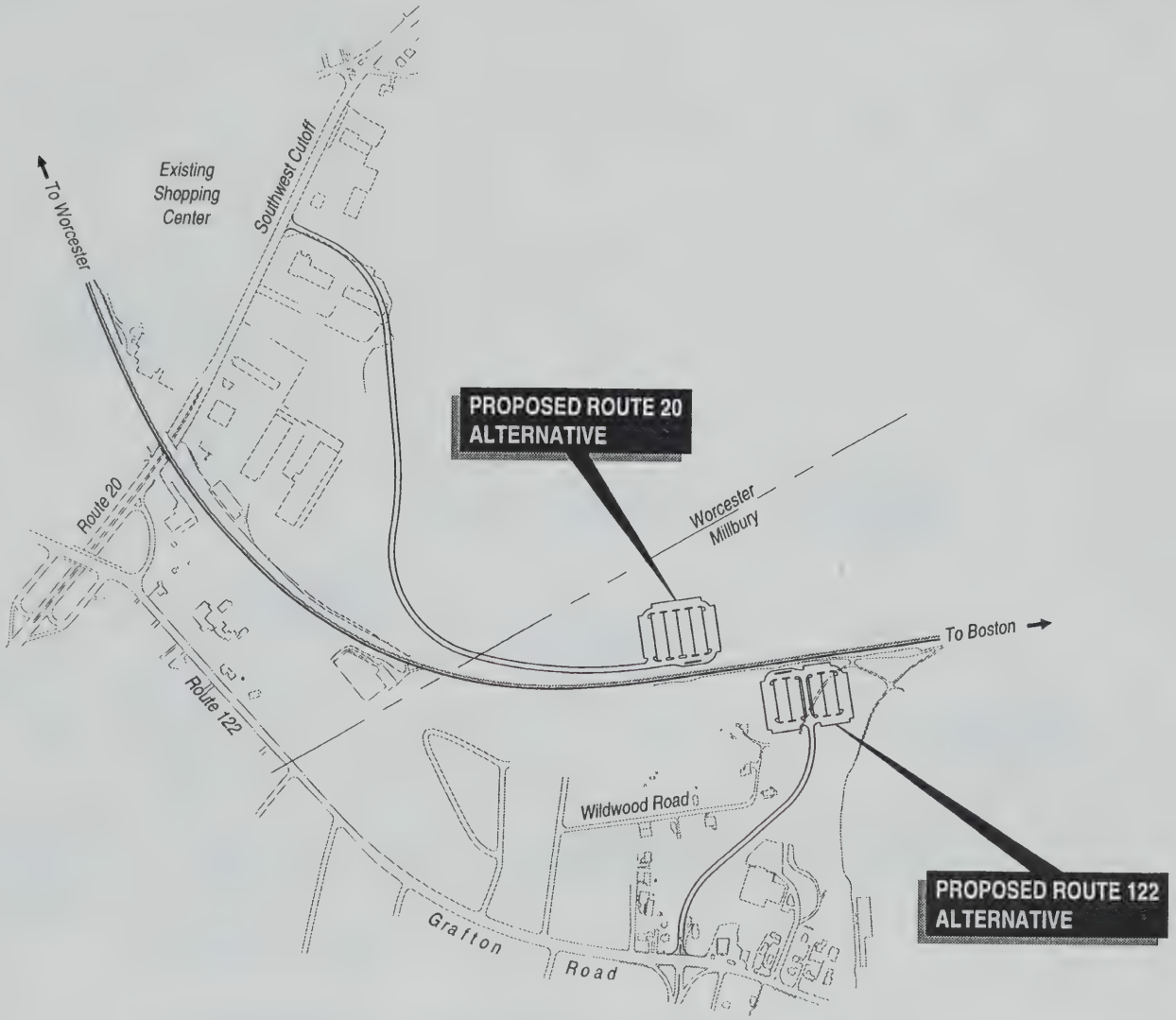
The station access drive will be a new two lane, 1,200 foot long roadway which will intersect Route 122 (Grafton Road) opposite the existing access road to the Massachusetts Turnpike at Exit 11. One residential taking will be required.

The alternate site accessed from Route 20 also lies in a secluded area, just north of the tracks and somewhat westerly of the former Millbury Junction. The site is wooded and is bordered by the Worcester City line to the west and north, by a wetland resource area to the east, and by the railroad tracks to the south. The site slopes moderately in an easterly direction.

The access drive will be a new 3,000 foot long roadway and will intersect Route 20 in Worcester opposite a shopping center driveway. The access drive traverses industrial land, and it is assumed that one industrial building will need to be taken.

Either station will consist of 300 paved parking spaces, two 800 foot long platforms, including 45 foot long access platforms, a drop-off area, a pedestrian overpass, site lighting, and landscaping. Intertrack fencing would be installed for the length of the station to discourage pedestrian crossing of the tracks. The station will be accessible to the disabled.

Site plans for the two Millbury station alternatives are presented on following pages. Potential impacts of the station are described in Section 12.



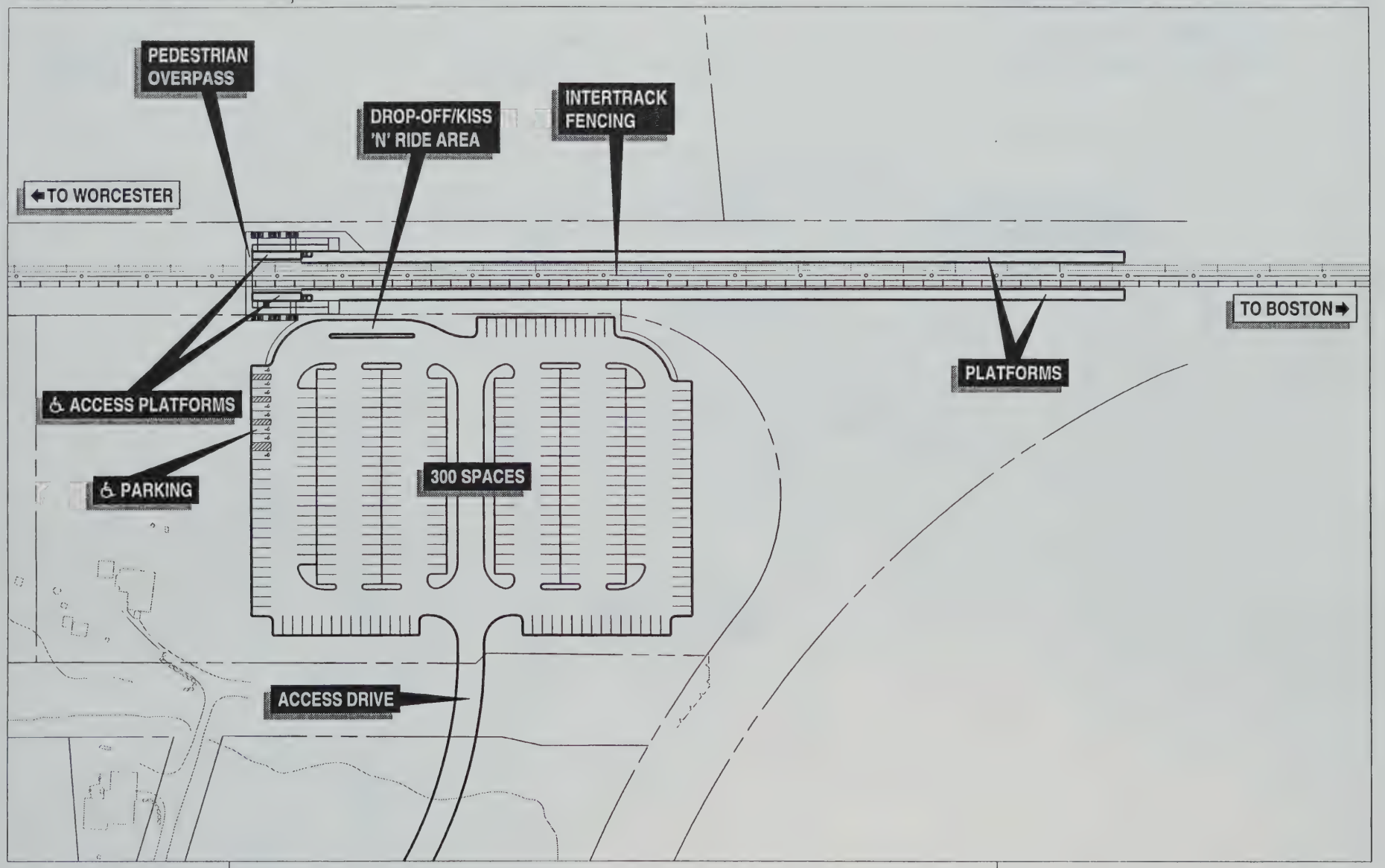
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 800'

0 800

LOCUS MAP - MILLBURY STATION ALTERNATIVES

FIGURE 3.2-6



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'
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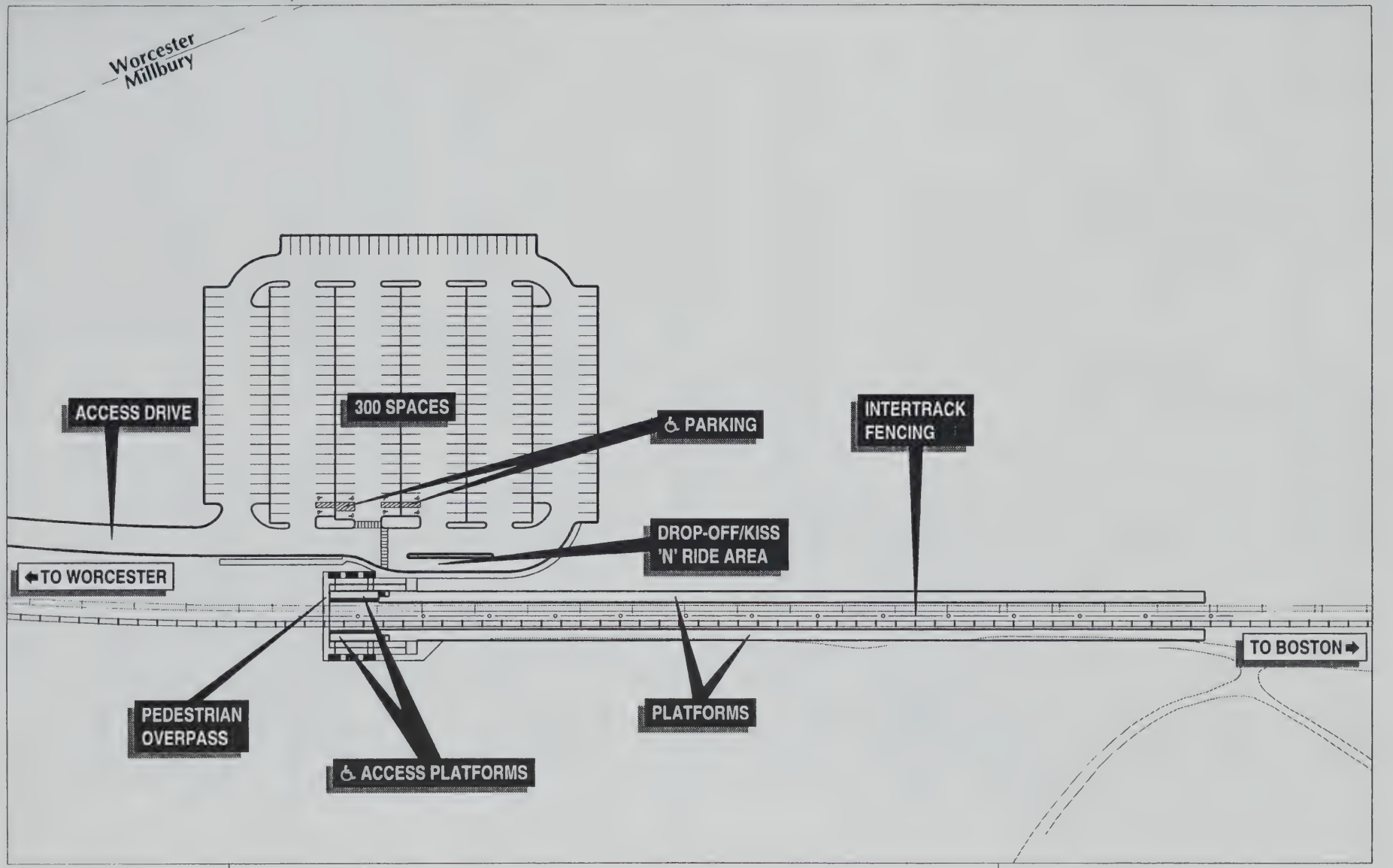
SITE PLAN
ROUTE 122 ALTERNATIVE
MILLBURY, MA

FIGURE 3.2-7



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'

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SITE PLAN
ROUTE 20 ALTERNATIVE
MILLBURY, MA

FIGURE 3.2-8

Grafton Station

The proposed Grafton commuter rail station site currently under consideration is located at Pine Street (Figure 3.1-1, Panel 3 of 8 on page 3-6, and Figure 3.2-9). After consideration of several alternatives, including the Tufts University site described in the Environmental Notification Form, the Pine Street site was selected based on the following advantages:

- Minimum wetlands impacts
- Minimum environmental impacts
- Increased site visibility
- Feasibility relative to track alignment
- General public acceptance
- Potential for future expansion
- Proximity to proposed biotech development

The site is located on the north side of the tracks and the westerly side of Pine Street, approximately 300 feet north of Westborough Road (Route 30). It lies approximately 1,800 feet west of the station site described in the ENF.

The site area currently consists of approximately two acres of open meadow bordered by wooded areas on the north, east and west. An existing gravel driveway from Pine Street accesses the site.

The proposed station will include approximately 250 paved parking spaces, two 800 foot long platforms, including 45 foot long access platforms, a drop-off area, a pedestrian overpass, lighting, and landscaping. A new 200 foot long driveway will be constructed providing access to the site from Pine Street. The station will be accessible to the disabled. Intertrack fencing would be installed for the length of the station to discourage pedestrian crossing of the tracks.

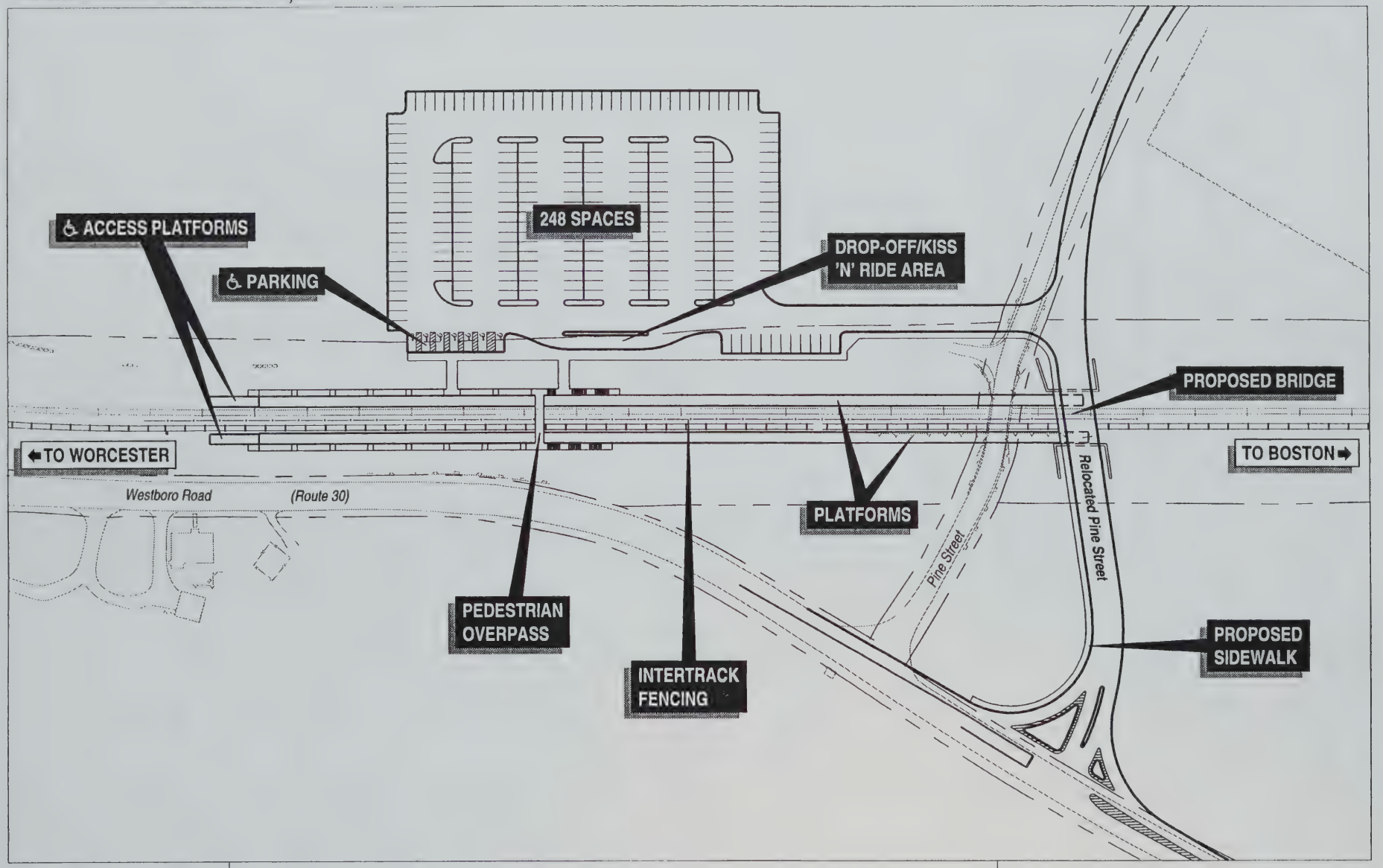
The Pine Street bridge adjacent to the station site is eligible for the Massachusetts Highway Department's ongoing program for replacement of functionally obsolete and structurally deficient bridges. Through interagency coordination, the MHD has agreed to schedule design and construction of the Pine Street bridge to be compatible with development of the commuter rail project. Design elements for the reconstruction will include the following:

- Increase vertical track clearance to 20'-8".
- Increase horizontal track clearances to Conrail criteria.
- Improve horizontal sight distance along Westborough Road/Route 30 from the Pine Street intersection.
- Widen Pine Street.
- Construct a sidewalk from Westborough Road into the station site.

The bridge design work will be coordinated with Conrail and the Grafton Department of Public Works.

Incorporating the pedestrian overpass into the reconstructed Pine Street bridge was evaluated during the conceptual design phase. Although it is feasible from an engineering perspective, the distance a commuter would have to walk from the parking lots to the platforms was considered to be excessive and undesirable. The alternative of realigning Pine Street closer to the station to reduce walking distance for commuters would not provide the desired sight distance improvements at the Route 30 intersection.

Potential impacts of the Grafton station are described in Section 13.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'

0 125

SITE PLAN
GRAFTON, MA

FIGURE 3.2-9

Westborough Station

The proposed commuter rail station in Westborough is located along the southerly side of Smith Valve Parkway, approximately one quarter mile west of the Otis Street intersection and about one and one quarter miles south of Route 9 (Figure 3.1-1, Panel 4 of 8 on page 3-7, and Figure 3.2-10).

The approximately 13 acre site consists of two distinct cover types. The northeasterly end is generally a low lying, wooded area with a combination of large and small trees, shrubbery, and grasses. Much of this area is classified as a wetland resource. The configuration of the parking lot will be designed to minimize impacts to this area. The site slopes generally in a northerly direction away from the tracks and towards Smith Valve Parkway.

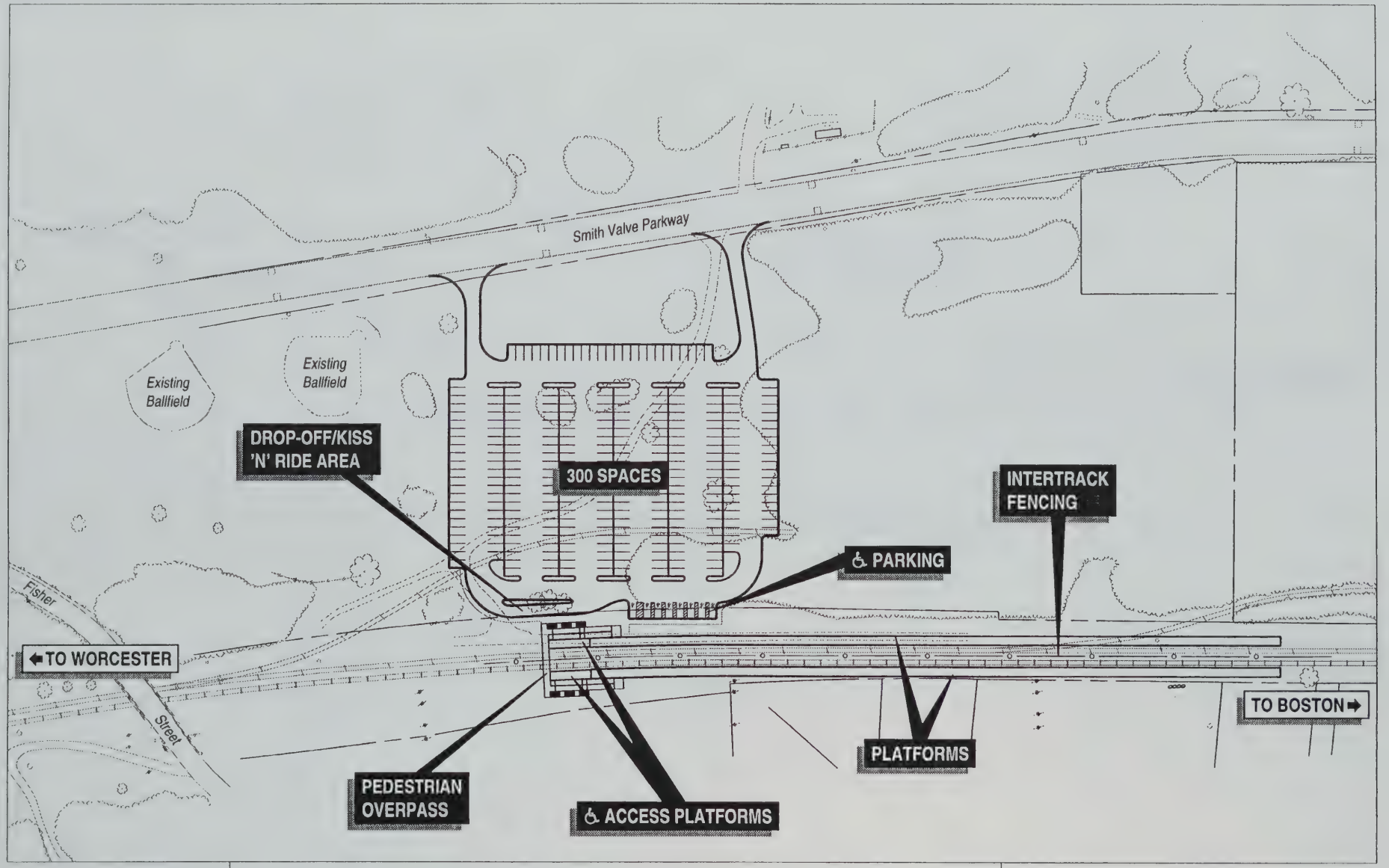
The westerly portions of the site are upland areas consisting of grass with a few scattered trees and shrubs, along with a privately-owned softball field and a railroad siding. This area of the site also slopes in a northerly direction towards Smith Valve Parkway.

The proposed station will be located between the ball field and the wetland area and will minimize the number of trees to be removed. The ballfield would be acquired by the MBTA as part of the land taking. The ultimate use and ownership of the field has not yet been determined but could be negotiated by the Town and the MBTA during the final design and mitigation process.

The station will consist of 300 paved parking spaces, two 800 foot long platforms, including 45 foot long access platforms, a drop-off area, a pedestrian overpass, lighting, and landscaping. Intertrack fencing would be installed for the length of the station to discourage pedestrian crossing of the tracks. The station will be accessible to the handicapped.

The preliminary site plan for the proposed Westborough station is shown on Figure 3.2-10. The configuration of the parking lot is subject to refinement during final design, pending a decision on the use of the ballfield and minimization of impacts to the wetland area as well as the engineering constraints presented by the curvature of the tracks.

Potential impacts of the Westborough station are described in Section 14.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 150'

0 150'

SITE PLAN
WESTBOROUGH, MA

FIGURE 3.2-10

Southborough Station

The proposed commuter rail station in Southborough is located just west of the Route 85 intersection with the mainline railroad (Figure 3.1-1, Panel 6 of 8 on page 3-9). Parking at this station will be provided on both sides of the tracks, as shown on the site plan (Figure 3.2-11).

The site north of the tracks is a 1.5 acre parcel which is currently occupied by a convenience/general store. The existing parking lot for the store is not well defined and the surface is a combination of asphalt, gravel, sand, and overgrown vegetation. The north side of the proposed station will consist of 90 paved parking spaces, an 800 foot long platform, including a 45 foot long access platform, a drop-off area, lighting, landscaping and a pedestrian overpass connecting the north and parts of the site south. It has been assumed that the general store will remain in its current location, and maintain the easterly portion of the site.

The area south of the tracks, bordered by the Sudbury River on the south, Cordaville Mill Pond on the west and Route 85 on the east, was the site of a textile mill from 1846 to 1929. Extant are building foundations, raceways, stone arch bridges, roadways, a dam, and the mill pond. The site of the two largest mill buildings now is used as a contractor storage yard, and there is no visible evidence of the original structures.

The proposed south side of the commuter rail station will consist of 330 paved parking spaces, an 800 foot long platform, a drop-off area, lighting, landscaping, and a 400 foot long access drive to Route 85. Intertrack fencing will be installed for the length of the station to discourage pedestrian crossing of the tracks. The station will be accessible for the handicapped.

The layout, grading, and landscape design of the south side part of the site will allow public access and recreational activities. Some of the adjacent land is owned by the Sudbury Valley Trustees, with which the design work related to recreation and access will be reviewed and coordinated.

The station site areas both north and south of the tracks typically lie two to six feet (2′ to 6′) below the existing track elevations. As such, the Southborough Station lends itself well to consideration of a pedestrian underpass as an alternative to the standard overpass previously described. Some discussions of the underpass alternative have already occurred. Although standard MBTA policy is to not construct pedestrian underpasses, due to the vandalism and safety concerns expressed by commuters, the MBTA will remain open to an underpass alternative during the station's final design process.

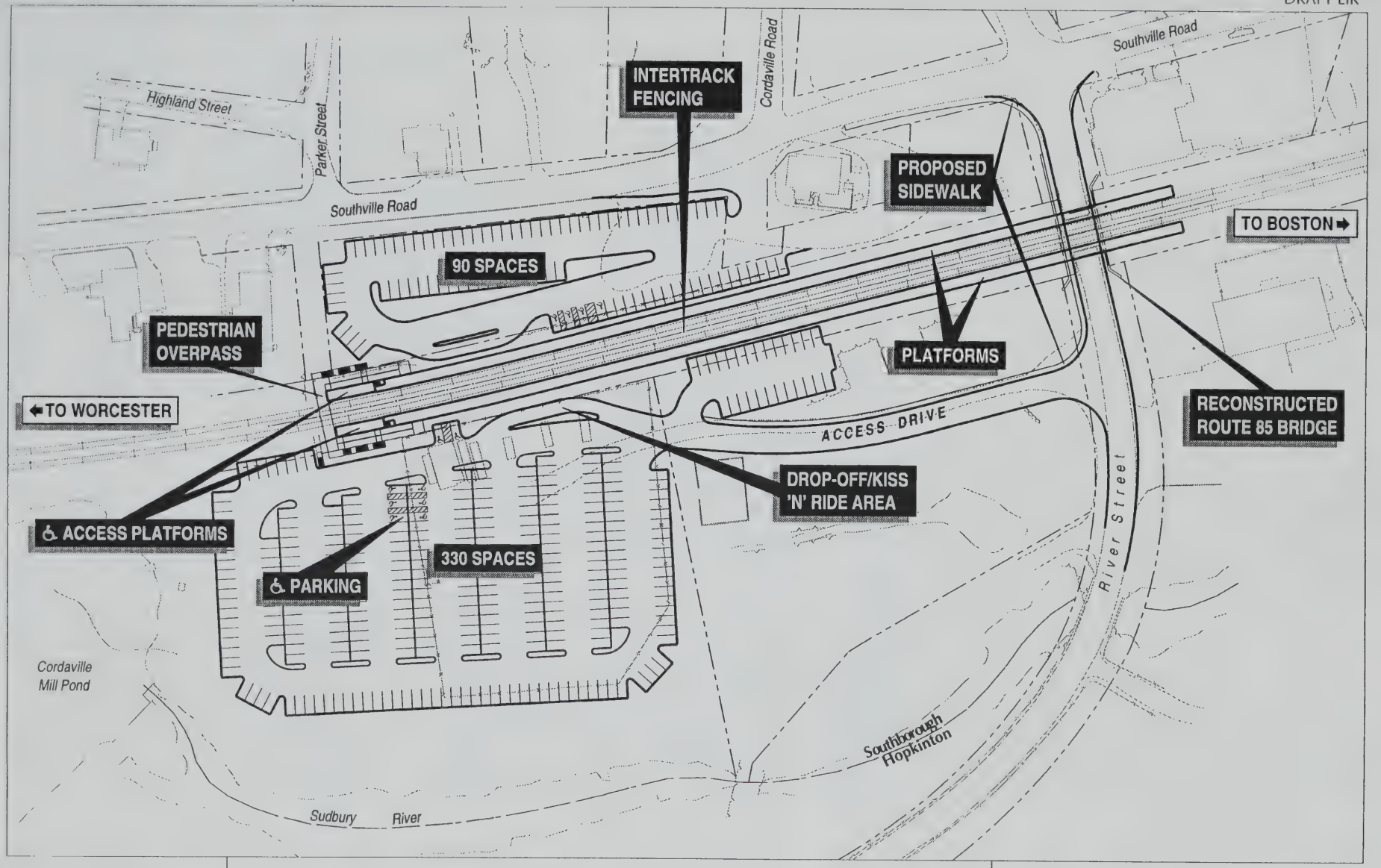
A third railroad crossing alternative included incorporating a pedestrian underpass at the Route 85/River Street Bridge. However, the excessive walking distance and extensive ramping made this option undesirable.

Proposed roadway improvements in the area will include the widening and reconstruction of the existing railroad bridge over Route 85 (if feasible). The reconstruction design will attempt to achieve the following goals:

- Improve the vertical roadway clearance
- Improve the horizontal clearance
- Improve horizontal sight distance
- Improve roadway drainage
- Reduce potential flooding conditions
- Allow for construction of a sidewalk of reasonable width for pedestrians

Work associated with design and construction of the bridge will be coordinated with the Massachusetts Highway Department, Conrail, and the Southborough Department of Public Works.

Potential impacts of the Southborough station are described in Section 15.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'

0 125

SITE PLAN
SOUTHBOROUGH STATION

FIGURE 3.2-11

Ashland Station

Two station site alternatives have been evaluated for the proposed commuter rail station in Ashland. Designated as the "East" and "West" alternatives, they are described below and shown on Figure 3.1-1, Panel 7 of 8, page 3-10, and on Figure 3.2-12. Although all of the questions pertaining to development of the Ashland Station East site have not been resolved, there is general consensus among the MBTA, the Town of Ashland, and other involved agencies that this is the preferred station alternative. The "West" alternative will be proposed as the Ashland Station only if the "East" option is determined to be infeasible. As a result, certain elements of site design for the west alternative have not yet been studied in detail.

The Ashland Station (East) alternative consists of parking both north and south of the railroad tracks. The north side parking lot is located on Pleasant Street approximately one half mile west of Ashland Center. This site, consisting of two vacant parcels, lies in a mixed-use area with industrial buildings to the east, the Latter Rain Church to the west and residential buildings across the street to the north. The site will consist of approximately 200 paved parking spaces, an 800 foot long platform including a 45 foot long access platform, a drop-off area, site lighting, landscaping, and a pedestrian overpass connecting the north and south sides of the site. The south side parking lot is located on Megunko Road, approximately one quarter mile from the intersection with Cherry Street. The site lies in an industrial area, portions of which are currently occupied by small businesses.

The southern part of the Ashland East Alternative is within the Nyanza Superfund Site. See Section 16.9 for description and discussion of the Nyanza Site. The site slopes generally in a northerly direction, draining into a brook that ultimately discharges into the Sudbury River. Several meetings, discussions, and correspondence have occurred between the MBTA, the Environmental Protection Agency (EPA), the Massachusetts Department of Environmental Protection Agency (DEP), the Army Corps of Engineers, and the Town of Ashland in an effort to identify issues and evaluate the feasibility of locating a commuter rail station within or adjacent to the Nyanza Site. With the exception of determining an acceptable resolution of the (assumable) hazardous waste liability issue (Chapter 21E laws), all parties are in agreement that constructing a commuter rail station at this location is feasible. Close coordination between all agencies will continue throughout the duration of this project.

The proposed station construction south of the tracks will consist of approximately 500 paved parking spaces, an 800 foot long platform with a 45 foot long access platform, a drop-off area, site lighting, and landscaping. The station will be accessed by a new 3,000 foot long roadway, which will intersect Route 135 (Union Street) at

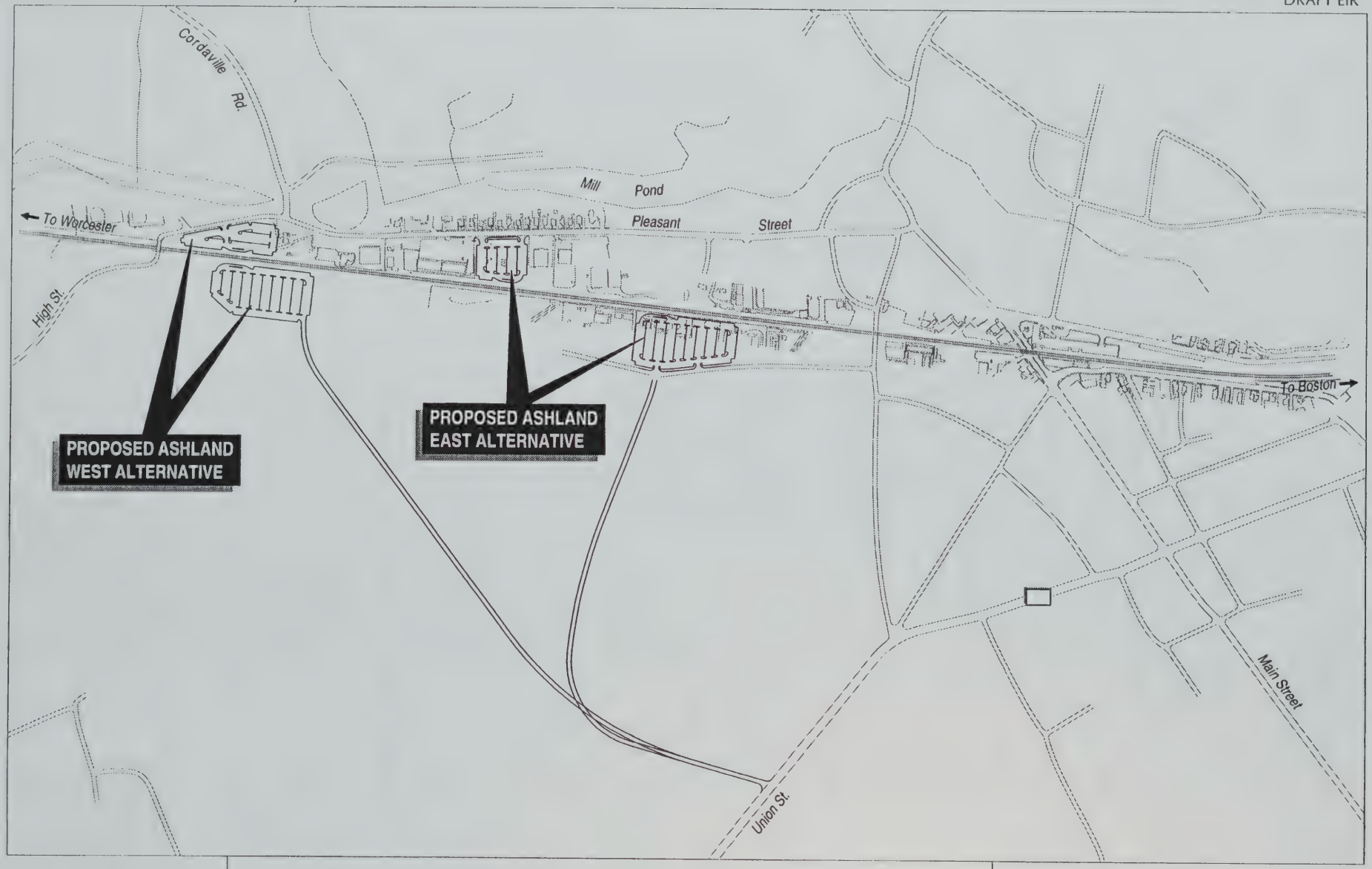
a point approximately 1,000 feet southwest of the Union Street—Summer Street—Cherry Street intersection. From this point the road will proceed in a northwesterly direction adjacent to an existing utility easement, then in a northerly direction along the former Trolley Brook Road and intersect Megunko Road at a point approximately 1,200 feet west of its intersection with Cherry Street.

The Ashland Station (West) alternative also consists of parking both north and south of the railroad tracks. The north side parking lot is located at the intersection of Pleasant Street, Cordaville Road, and High Street. The site is a two and one half acre parcel currently occupied by Burnham's Restaurant. The parking lot proposal includes retaining the restaurant, and will provide approximately 200 spaces to be used jointly by restaurant customers and commuter rail passengers. The site will also provide an 800 foot long platform with a 45 foot long access platform, a drop-off area, site lighting, landscaping, and a pedestrian overpass connecting the parking lot south of the tracks.

The south side parking lot is located directly opposite the north side lot, and lies within a currently undeveloped parcel. The area is wooded, lies at the base of a large hill, and drains generally in an easterly direction. The site will consist of approximately 500 paved parking spaces, a drop-off area, an 800 foot long platform with a 45 foot long access platform, site lighting, and landscaping. The site will be accessed by a new 4,000 foot long roadway, that will begin at the same location as the east alternative described above, but will extend in a northwesterly direction south and west of the Nyanza "capped" site and connect directly to the south side parking lot. Preliminary investigations indicate the presence of substantial wetland resources in this area and development may require a wetland variance from the DEP. For this reason, detailed site design for this alternative will not be performed until and unless all other station site alternatives are determined to be infeasible.

Each Ashland Station alternative will include intertrack fencing to discourage pedestrian at-grade crossing of the track and will be accessible.

Site plans for the two Ashland station alternatives are shown on Figures 3.2-13 and 3.2-14. Potential impacts of the Ashland Station alternatives are described in Section 16.

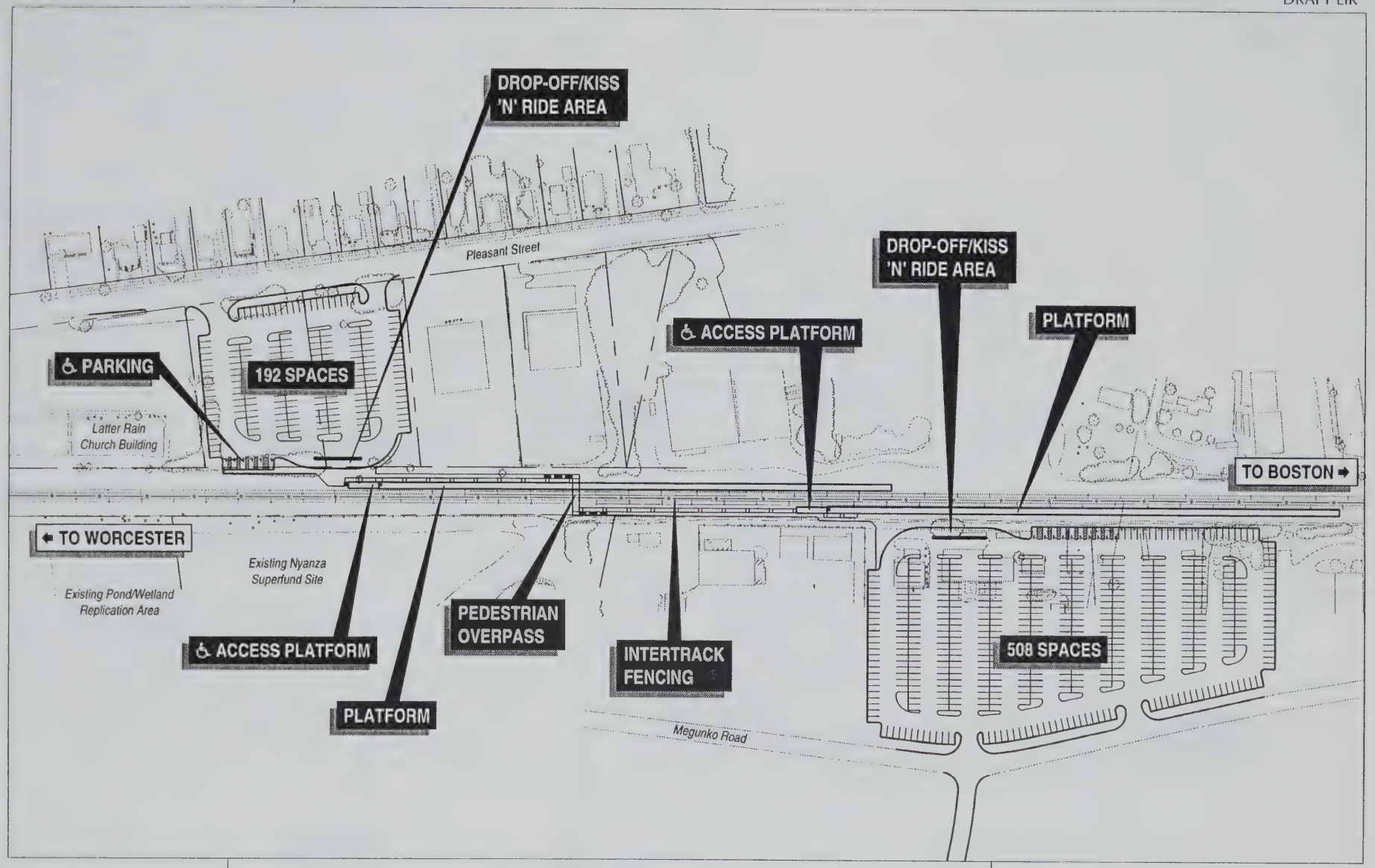


Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 800'
0 800

LOCUS MAP - ASHLAND STATION ALTERNATIVES

FIGURE 3.2-12

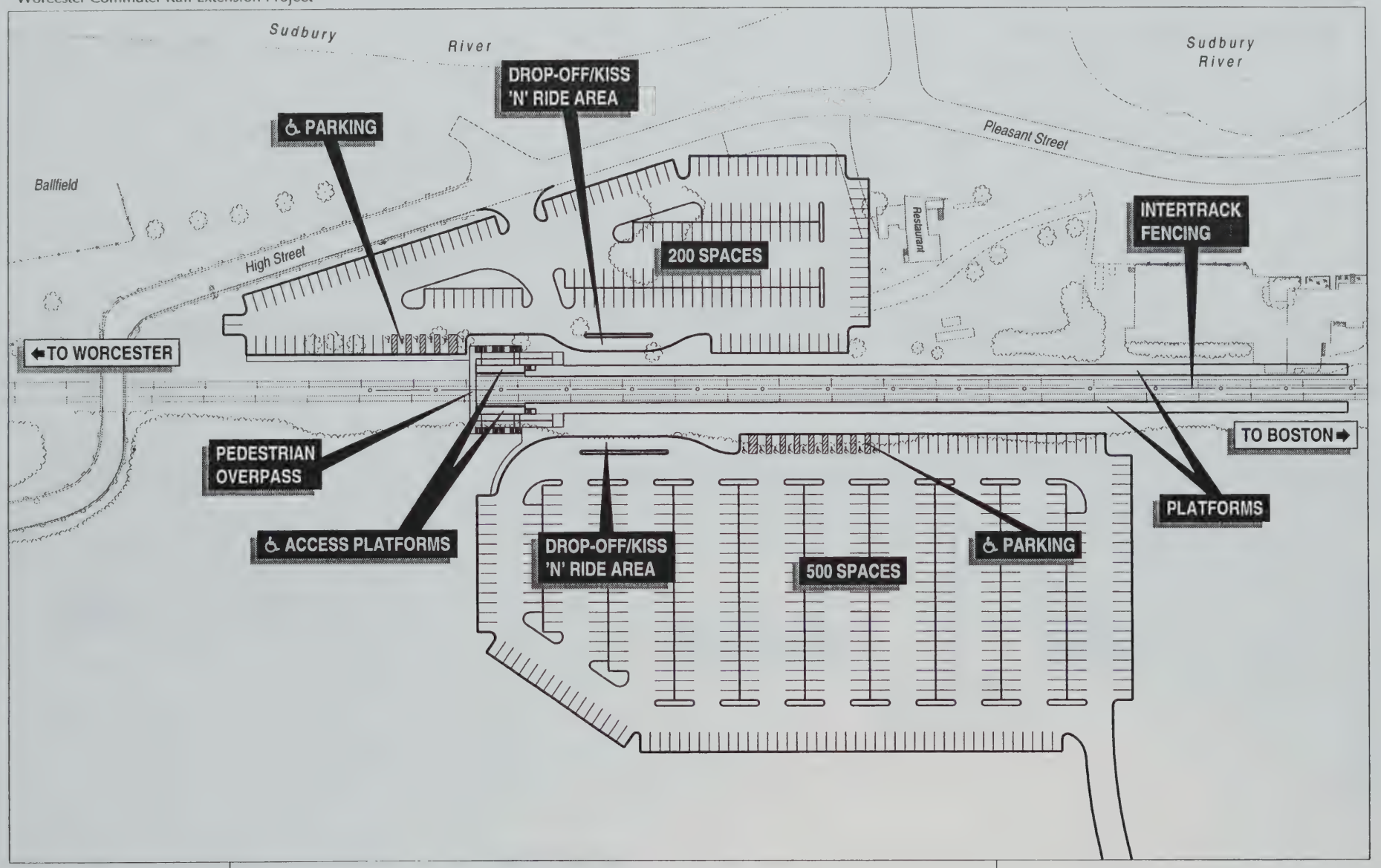


Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'
0 200

SITE PLAN
ASHLAND EAST ALTERNATIVE

FIGURE 3.2-13



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'

0 125

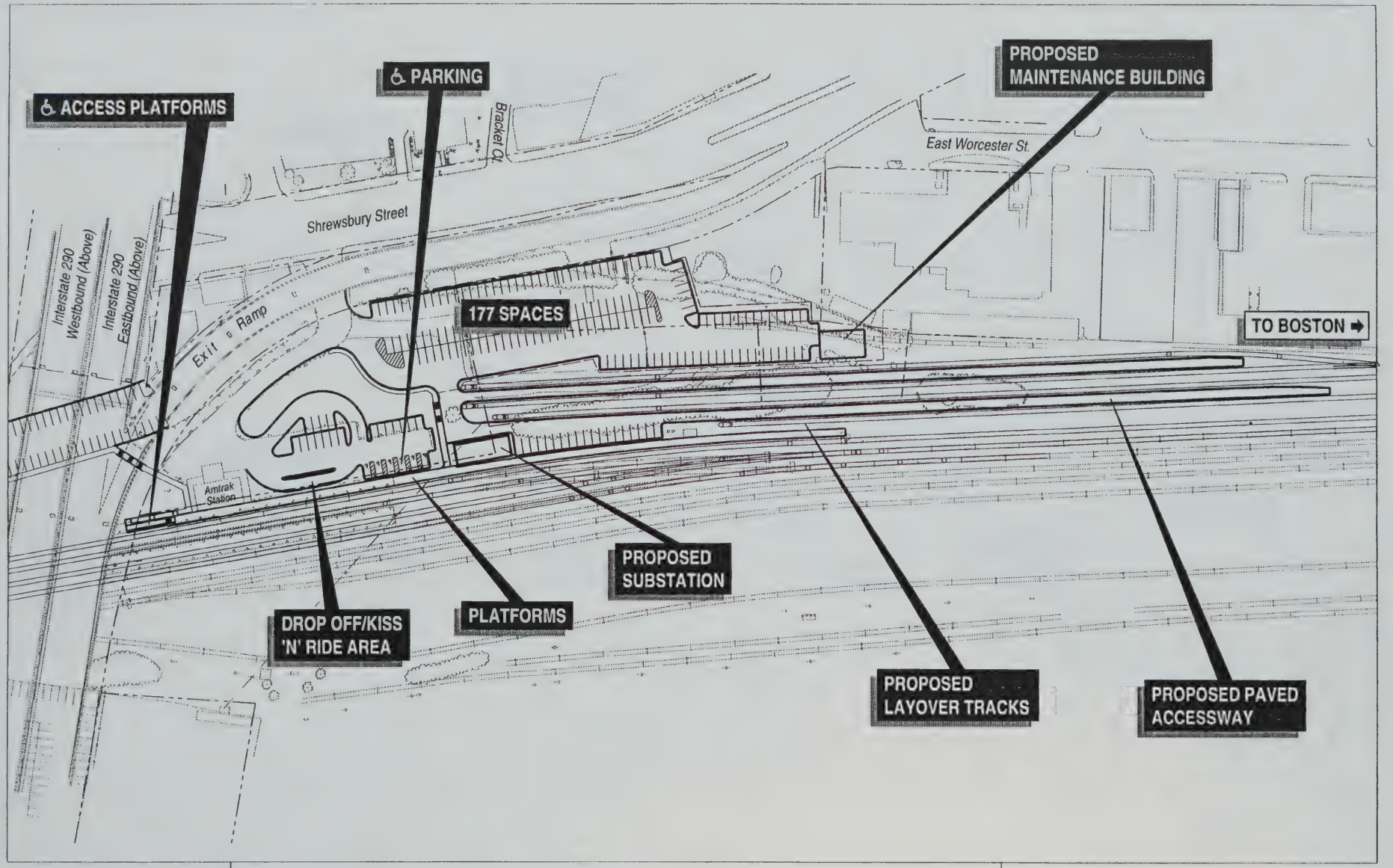
SITE PLAN
ASHLAND WEST ALTERNATIVE

FIGURE 3-2-14

3.3 Layover Facility

The proposed layover facility location is an existing rail yard east of the Amtrak Worcester Station at Mile Post 43.5. It is adjacent to the Amtrak station which will be used as the Worcester terminus for Interim service. A site plan of the proposed layover site with preliminary track layout is shown in Figure 3.3-1. The layover facility has been proposed near the Worcester terminus, rather than nearer Boston, because the Worcester location will eliminate the movement of empty trains (deadhead movement) back to a central facility at night and out to the Worcester station in the morning where service initiates. Trains originating in Boston would provide for the reverse commute to Worcester. The proposed Worcester site can accommodate four train sets with the necessary support facilities. It is located within an existing railroad area and automobile junkyard. There are no sensitive environmental areas on site, such as wetlands or municipal water supplies. The surrounding land use is mostly industrial and includes Conrail yards and the Worcester Department of Public Works garage. An elderly housing facility is near the site but is separated from the layover facility by Shrewsbury Street and an exit ramp from I-290.

The layover facility site selection process and evaluation criteria are described in Section 8.0. The environmental impacts of the proposed layover facility are described in Section 9.0.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 150'

0 150

SITE PLAN - LAYOVER FACILITY WORCESTER, MA

FIGURE 3.3-1

3.4 Commuter Rail Train Schedules

The proposed Worcester Extension fare structure is identical to that of other MBTA commuter rail lines and uses a zone assignment for each station stop based on travel distance from the terminal station in Boston. Table 3.4-1 shows proposed zone assignments for new stations on the Worcester commuter rail extension and the current fare structure for those zones; the fares shown are those pertinent to typical commuters to Boston. The complete MBTA commuter rail fare schedules are included in Section 1.3.

Table 3.4-1 Proposed Zone Assignments and Fare Structure Worcester Commuter Rail Extension

Proposed Station	Proposed Zone	Fare Structure		
		One Way	12 Ride	Monthly Pass
Ashland	6	$3.50	$35.00	$112.00
Southborough	6	3.50	35.00	112.00
Westborough	8	4.00	40.00	128.00
Grafton	8	4.00	40.00	128.00
Millbury	8	4.00	40.00	128.00
Worcester	9	4.75	47.50	136.00

Under the provisions of the MEPA Certificate issued for the Notice of Project Change, interim service to Worcester began on September 26, 1994. This service provides three trains in the A.M. and P.M. peak commuting hours travelling express between Worcester and Framingham. Approximate train departure and arrival times and proposed station stops between Framingham and South Station are shown in Tables 3.4-2 and 3.4-3. The interim service schedule will not accommodate reverse commuting and there will be no weekend service.

By 1996, as the intermediate stations are constructed, the train schedule will be increased to provide basic service consisting of 10 operations in each direction per day. There will be four trains inbound to Boston during the A.M. commuting hours and five trains departing South Station during the P.M. peak hours. Approximate train schedules shown in Table 3.4-4 and 3.4-5 assume that all of the intermediate stations are constructed.

The proposed basic service will include four A.M. peak hour trains making all stops between Worcester and Framingham, then express to Boston. The other six trains also will make all stops between Worcester and Framingham (except one that is express to Framingham) and continue to Boston as part of the current Framingham

to Boston scheduled service. The balance of the scheduled 15 trains from Framingham to Boston will be unaffected expect for minor schedule adjustments.

Trains from Boston to Worcester will include four P.M. peak hour trains running express to Framingham, then making all stops between Framingham and Worcester. The other six trains from Boston will make the regular Framingham line stops, then continue to Worcester making all station stops. The balance of the scheduled 16 trains from Boston to Framingham will be unaffected except for minor schedule adjustments.

As ridership increases, an expanded service schedule could be implemented, resulting in 16 trains per day in each direction between Worcester and Framingham. The additional train operations would primarily provide better off-peak service; the number of peak hour commuter trains would remain the same as the basic service. Approximate train schedules are shown in Tables 3.4-6 and 3.4-7. As was the case under Basic Service, Expanded Service would not diminish the existing Framingham-Boston service.

Table 3.4-2 Interim Service Worcester Commuter Rail Eastbound MBTA Trains Worcester to South Station

TRAIN	START TIME	ARRIVAL TIME	WORCESTER	MILLBURY	GRAFTON	WESTBOROUGH	SOUTHBOROUGH	ASHLAND	FRAMINGHAM	WNATICK	NATICK	WELLSQUARE	WELLHILLS	WELLFARMS	AUBURNDALE	WNEWTON	NEWTONVILLE	BACKBAY	SOUTHSTATION
500	05:45 A.M.	07:02 A.M.	O						S	S	S	S	S	S	S	S	S	S	D
502	06:20 A.M.	07:20 A.M.	O						S									S	D
510	07:15 A.M.	08:15 A.M.	O						S									S	D

O = ORIGIN D= DESTINATION S= STOP

Table 3.4-3 Interim Service Worcester Commuter Rail Westbound MBTA Trains South Station to Worcester

TRAIN	START TIME	ARRIVAL TIME	WORCESTER	MILLBURY	GRAFTON	WESTBOROUGH	SOUTHBOROUGH	ASHLAND	FRAMINGHAM	W NATICK	NATICK	WELLESQUARE	WELLHILLS	WELLFARMS	AUBURNDALE	W NEWTON	NEWTONVILLE	BACK BAY	SOUTH STATION
517	04:50 P.M.	05:55 P.M.	D						S	S								S	O
521	05:30 P.M.	06:49 P.M.	D						S	S	S	S	S	S	S	S	S	S	O
523	06:00 P.M.	07:00 P.M.	D						S									S	O

O = ORIGIN D= DESTINATION S= STOP

Table 3.4-4 Basic Service
Worcester Commuter Rail
Eastbound MBTA Trains
Worcester to South Station

TRAIN	START TIME	ARRIVAL TIME	WORCESTER	MILLBURY	GRAFTON	WESTBOROUGH	SOUTHBOROUGH	ASHLAND	FRAMINGHAM	WNATICK	NATICK	WELLSQUARE	WELLHILLS	WELLFARMS	AUBURNDALE	WNEWTON	NEWTONVILLE	BACKBAY	SOUTHSTATION
502A	06:00 A.M.	07:10 A.M.	O	S	S	S	S	S	S									S	D
504A	06:50 A.M.	08:00 A.M.	O	S	S	S	S	S	S									S	D
506	07:20 A.M.	08:40 A.M.	O						S	S	S	S	S	S	S	S	S	S	D
506A	07:40 A.M.	08:50 A.M.	O	S	S	S	S	S	S									S	D
510	08:10 A.M.	09:20 A.M.	O	S	S	S	S	S	S									S	D
514	11:30 A.M	01:00 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
518	03:05 P.M.	04:35 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
520A	05:20 P.M.	06:40 P.M.	O	S	S	S	S	S	S	S	S	S	S	S				S	D
526	07:40 P.M.	08:50 P.M.	O	S	S	S	S	S	S									S	D
530	09:50 P.M.	11:20 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D

O = ORIGIN D= DESTINATION S= STOP

Table 3.4-5 Basic Service Worcester Commuter Rail Westbound MBTA Trains South Station to Worcester

TRAIN	START TIME	ARRIVAL TIME	WORCESTER	MILLBURY	GRAFTON	WESTBOROUGH	SOUTHBOROUGH	ASHLAND	FRAMINGHAM	W NATICK	NATICK	WELLESQUARE	WELLHILLS	WELLFARMS	AUBURNDALE	W NEWTON	NEWTONVILLE	BACK BAY	SOUTH STATION
505	06:50 A.M.	08:10 A.M.	D	S	S	S	S	S	S	S	S	S	S					S	O
509	09:05 A.M.	10:30 A.M.	D	S	S	S	S	S	S	S	S	S	S	S				S	O
513	12:35 P.M.	02:05 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
515A	04:25 P.M.	05:35 P.M.	D	S	S	S	S	S	S									S	O
519	04:55 P.M.	06:05 P.M.	D	S	S	S	S	S	S									S	O
521	05:25 P.M.	06:35 P.M.	D	S	S	S	S	S	S									S	O
521A	06:10 P.M.	07:20 P.M.	D	S	S	S	S	S	S									S	O
523	06:20 P.M.	07:50 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
527	08:20 P.M.	09:50 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
531	11:00 P.M.	12:30 A.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O

O = ORIGIN D= DESTINATION S= STOP

Table 3.4-6 Expanded Service Worcester Commuter Rail Eastbound MBTA Trains Worcester to South Station

TRAIN	START TIME	ARRIVAL TIME	WORCESTER	MILLBURY	GRAFTON	WESTBOROUGH	SOUTHBOROUGH	ASHLAND	FRAMINGHAM	WNATICK	NATICK	WELLSQUARE	WELLHILLS	WELLFARMS	AUBURNDALE	WNEWTON	NEWTONVILLE	BACKBAY	SOUTHSTATION
502A	06:00 A.M.	07:10 A.M.	O	S	S	S	S	S	S									S	D
504A	06:50 A.M.	08:00 A.M.	O	S	S	S	S	S	S									S	D
506	07:20 A.M.	08:40 A.M.	O						S	S	S	S	S	S	S	S	S	S	D
506A	07:40 A.M.	08:50 A.M.	O	S	S	S	S	S	S									S	D
510	08:10 A.M.	09:20 A.M.	O	S	S	S	S	S	S									S	D
512	09:20 A.M.	10:50 A.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
514	11:30 A.M.	01:00 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
516	01:20 P.M.	02:50 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
518	03:05 P.M.	04:35 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
520	05:05 P.M.	06:15 P.M.	O	S	S	S	S	S	S									S	D
520A	05:20 P.M.	06:40 P.M.	O	S	S	S	S	S	S	S	S	S	S	S				S	D
522	06:00 P.M.	07:20 P.M.	O	S	S	S	S	S	S	S	S	S	S	S				S	D
526	07:40 P.M.	08:50 P.M.	O	S	S	S	S	S	S									S	D
528	08:40 P.M.	09:50 P.M.	O	S	S	S	S	S	S									S	D
530	09:50 P.M.	11:20 P.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D
532	11:50 P.M.	1:20 A.M.	O	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	D

O = ORIGIN D= DESTINATION S= STOP

Table 3.4-7 Expanded Service Worcester Commuter Rail Westbound MBTA Trains South Station to Worcester

TRAIN	START TIME	ARRIVAL TIME	WORCESTER	MILLBURY	GRAFTON	WESTBOROUGH	SOUTHBOROUGH	ASHLAND	FRAMINGHAM	WNATICK	NATICK	WELLSQUARE	WELLHILLS	WELLFARMS	AUBURNDALE	WNEWTON	NEWTONVILLE	BACKBAY	SOUTHSTATION
503	05:20 A.M.	06:30 A.M.	D	S	S	S	S	S	S									S	O
505	06:50 A.M.	08:10 A.M.	D	S	S	S	S	S	S	S	S	S	S					S	O
507	07:35 A.M.	08:55 A.M.	D	S	S	S	S	S	S	S	S	S	S					S	O
509	09:05 A.M.	10:30 A.M.	D	S	S	S	S	S	S	S	S	S	S	S				S	O
511	11:05 A.M.	12:35 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
513	12:35 P.M.	02:05 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
515	02:20 P.M.	03:50 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
515A	04:25 P.M.	05:35 P.M.	D	S	S	S	S	S	S									S	O
519	04:55 P.M.	06:05 P.M.	D	S	S	S	S	S	S									S	O
521	05:25 P.M.	06:35 P.M.	D	S	S	S	S	S	S									S	O
521A	06:10 P.M.	07:20 P.M.	D	S	S	S	S	S	S									S	O
523	06:20 P.M.	07:50 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
525	06:55 P.M.	08:25 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
527	08:20 P.M.	09:50 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
529	09:30 P.M.	11:00 P.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O
531	11:00 P.M.	12:30 A.M.	D	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O

O = ORIGIN D = DESTINATION S = STOP

3.5 Implementation Schedule

As noted in the preceding section, interim service began operating on September 26, 1994.

Assuming that MEPA review, permitting, design and construction proceed expeditiously, the intermediate stations would be on line by October, 1996 at which time the 20 train basic service would be implemented.

As ridership demand increases, the number of train operations can be increased; it is anticipated that the expanded service 32 train schedule could be operating by the year 2001.

3.6 Costs and Revenues

Before the project proceeded to environmental review, it was the subject of a detailed feasibility report requested by the legislature. The feasibility report cost estimates do not reflect all the costs of the project as now proposed to MEPA, as the project has been somewhat redefined since the feasibility report. Two additional stations have been added, in Millbury and Southborough. These new stations will require additional signals and other infrastructure. Parking has been expanded beyond what the feasibility report covered. Revised cost estimates for required station access for the disabled have been incorporated. All told, the MBTA now estimates the project will cost $112 million, of which about $78 million will be for track and signal improvements, layover facility, stations and land acquisition costs, and $34 million for rolling stock. Table 3.6-1 provides a breakdown of the estimated construction costs. The MBTA plans to use state bond funds to cover the project's capital costs. Annual debt service will equal approximately $9.7 million, according to the MBTA's most recent estimate.

The MBTA's most recent estimate of operating costs per year for the Worcester extension as now proposed is approximately $12 million dollars. Annual revenue is projected at approximately $5 million. This yields about a 42% cost recovery ratio for the proposed Worcester service. This ratio is well in excess of the MBTA's overall target of 33⅓% for recovery of all operating costs, and higher than for other commuter rail services offered by the MBTA.

The MBTA has calculated the net annual cost of the project, which is the sum of its annualized capital cost and its estimated annual operating cost, less estimated revenue. See Section 4.1 for a further discussion of this concept and its calculation as these matters are addressed in the project's 1990 feasibility study. Table 3.6-1 of the DEIR is the source of the cost data for the capital costs. The annualized capital cost of the project is $3.3 million. See Table 3.6-2. Since, as just stated, the MBTA projects an annual operating cost for the project of $12 million, the project's total annual cost is $15.3 million. Less projected annual revenue of $5 million, the project's net annual cost is approximately $10.3 million. See Table 3.6-3.

The MBTA, for the Old Colony project, completed a financial feasibility analysis which included, in addition to the Old Colony project, a number of other major capital improvements, including the Newburyport extension and the refurbishment of the Worcester line. The analysis concluded that all these projects were within the overall financial capability of the MBTA based on a thorough review of its current finances.

Table 3.6-1 Construction Cost Estimate

Project Element	Estimated Cost	Project Element	Estimated Cost
Track and R.O.W. Improvements		**Layover Facility**	
New 2nd Track (CP 33 to MP 40.3)	$6,500,000	Track and Fencing	$2,000,000
Rebuild Existing Siding (MP 40.3 to 44.2)	3,000,000	Electrical System	1,200,000
Install 4 Universal Crossovers	2,000,000	Lighting	300,000
Replace all Existing Turnouts	1,000,000	Drainage and Grading	400,000
Ditching and Drainage Work	500,000	Crew Quarters and Parking	300,000
Ties and Surfacing Existing Tracks	1,700,000		
Upgrade Crossing (MP 37.2)	100,000	**Station/Parking Development**	
Fence R.O.W.	400,000	Ashland	4,600,000
Bridge and Culvert Repairs/Replacement	3,000,000	Southborough	3,200,000
Signal, Power and Communications		Westborough	2,800,000
New Interlocking (CP 22 to Worcester)	7,200,000	Grafton	3,000,000
Signal System (CP 22 to Worcester)	1,200,000	Millbury	3,300,000
Cab Signals ("Cove" to CP 22)	1,800,000	Worcester	1,100,000
New Interlocking (CP 3 to CP 4)	3,200,000		
Upgrade/replace crossing systems	1,300,000	**Land Acquisition**	
Supervisory Control System	200,000	(station sites and layover)	6,000,000
Communications Systems	1,500,000		
Subtotal	**$34,600,000**	**Subtotal**	**$28,200,000**
Total Rail and Site			**$62,800,000**
3% Project Administration and Field Inspection			1,880,000
12% Contingency			7,540,000
8% Engineering Design			5,780,000
TOTAL CONSTRUCTION ESTIMATE			**$78,000,000**
Rolling Stock: (4 train sets)			34,000,000
TOTAL PROJECT COST			**$112,000,000**

Table 3.6-2 Annualized Capital Cost for Preferred Alternative

Capital Element	Years' Life Expectancy	Cost	Annual Cost
Land	100	$6,000,000	$60,000
Roadbed	100	500,000	5,000
Tracks	30	14,300,000	476,666
Bridges	30	3,000,000	100,000
Signals	30	16,400,000	546,666
Stations	30	18,000,000	600,000
Layover	30	4,200,000	140,000
Fencing	20	400,000	20,000
Rolling stock	25	34,000,000	1,360,000
TOTALS		$96,800,000	$3,308,332

Table 3.6-3 Net Annual Cost of Worcester Extension Project

Annualized Capital Cost	$3,308,332
Annual Operating Cost	$12,000,000
Total Annual Cost	$15,308,332
Annual Revenues	$5,000,000
Net Annual Cost	$10,308,332

3.7 MBTA Mitigation Policy

The basic rule of thumb regarding mitigation of impacts resulting from the implementation of MBTA construction projects and other actions is that "if the MBTA breaks it, they will fix it." This policy is applicable to both the on site and off site impacts of the Worcester Commuter Rail Extension project. This mitigation policy has been discussed at Town Rail Committee meetings in March 1994 and at Citizens Advisory Committee (CAC) meetings. Not all impacts cause breakage. For example, with respect to traffic impacts resulting from commuter station generated traffic, some additional traffic at intersections and on roadway segments may not necessarily result in a significant impact, especially if the intersection or roadway will still operate at an acceptable level of service (LOS). If station generated traffic degrades the level of

service from LOS D or better to LOS E or LOS F, corrective action will be proposed. If an existing condition reveals an unacceptable LOS for an intersection or roadway segment, and the addition of station generated traffic materially worsens that condition, every reasonable effort will be made to correct the problem created by the additional burden, generally in cooperation with MHD or the relevant town, according to jurisdiction. However, to mitigate such that the original deficiency is corrected may be infeasible in some cases. Moreover, "fixing," again using the traffic example, means restoring an acceptable level of service, LOS D in the project area, though often traffic mitigation will result in improvements well above LOS D.

Noise and vibration impacts resulting from the addition of commuter train operations are evaluated in terms of current and proposed Federal Transit Administration (FTA) criteria, supplemented by the Massachusetts DEP noise policy. Train noise that is considered highly annoying for a given land use category or that results in an increase of more than 5 dBA will be considered for noise abatement measures. Site specific evaluations will address potential control measures which could include a strictly enforced equipment maintenance program, sound barriers, and directional train horns. Although no vibration induced damage from train operations is predicted, ground-borne vibration generated by MBTA trains will result in the increase of vibration events per day, rather than higher levels. Where (depending on land use category) the increase in vibration events is considered to be significant, potential mitigation measures could include a strictly enforced equipment maintenance program, the installation of ballast mats, or the use of wood versus concrete railroad ties.

Recently adopted MBTA policy provides for the expenditure of up to 2% of the project construction cost for noise and vibration impact mitigation. Consideration of the cost effectiveness of any noise mitigation measures must be weighted against the actual relief provided.

Wetland impacts will be mitigated in terms of compliance with the appropriate regulatory requirements. The primary thrust of the right-of-way and commuter station design effort will be to avoid wetland, floodplain and drainage impacts. Where total avoidance is not possible, the design will seek to minimize any wetland alteration and, where alteration is unavoidable, will include construction methods and control measures to reduce short-term and long-term effects.

This DEIR will present mitigation proposals where applicable or, in more complex cases, mitigation options. The DEIR also will detail improvements and other local benefits which have been suggested by local town officials. Mitigation and local benefit possibilities will continue to be discussed with the relevant towns throughout the MEPA review process.

SECTION 4.0 ALTERNATIVES ANALYSIS

This Section discusses several alternatives to the proposed project presented in this DEIR. First, the alternatives considered in the MBTA's 1990 feasibility report are reviewed, and the choice of the Worcester Extension project is explained. Then a non-rail alternative to the Worcester Extension project presented in this DEIR is considered, evaluating the impacts of express bus service providing service roughly equivalent to the project's. A "No Build" analysis is performed, as a basis for gauging present and future impacts with and without the project. Finally, the preferred alternative is explained in terms of the MBTA's policy goals, existing state regulations and federal regulations and law.

4.1 Feasibility Report Analyses

To advance its policy of revitalizing commuter rail services in the Boston metropolitan area in the 1980's, the legislature authorized the MBTA to perform a feasibility study ("Feasibility Study") of restoring service to Worcester. Added later to this study for consideration were possible extensions of service from Framingham to Milford, via the existing 12.3-mile Holliston Industrial Line, and from Framingham to Marlborough, via a 10.3-mile right-of-way comprising the Framingham Secondary and Fitchburg Secondary lines. Milford service had been discontinued in 1959, Marlborough service in phases in the 1930's. Freight service along many of these lines, as along the proposed Worcester line, continued, though in some areas only infrequently, while in other areas tracks have been removed altogether.

Alternatives Considered

The three lines evaluated in the Feasibility Study were compared using uniform assumptions: upgrading of track, signals, sidings, grade crossings and right-of-way fencing to meet MBTA standards; upgrading or creation of stations with standard platforms, canopies, handicapped access by means of so-called "mini-high" platforms; parking to serve projected ridership; 30 minute headways in the peak, 120 minute headways otherwise, to meet MBTA standard operating schedules; modern diesel locomotives and bilevel coaches for rolling stock, of a quantity to meet scheduling

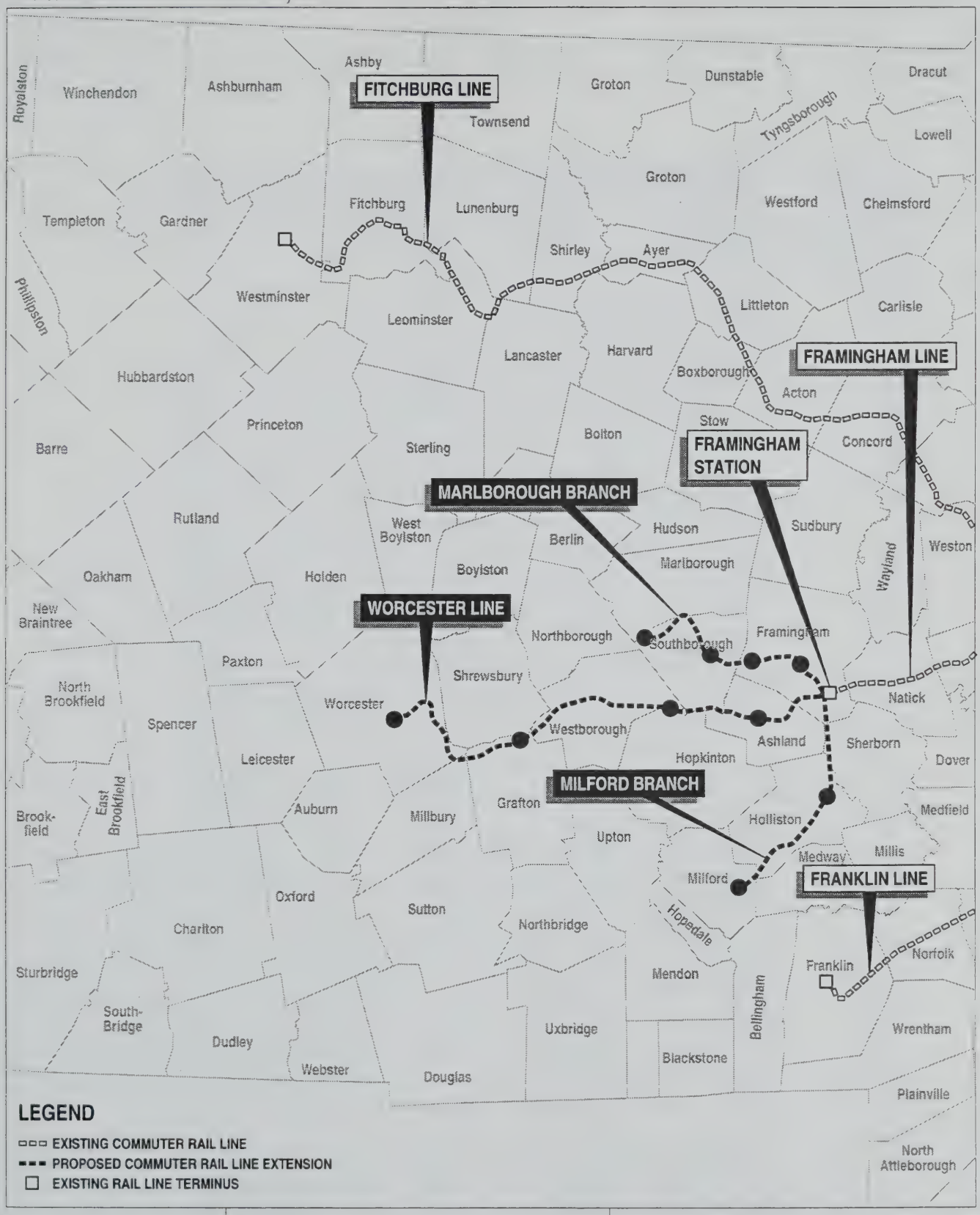
and projected passenger volume needs; and layover facilities adequate for four train sets per line.

Several locations on each line were screened for possible stations, using such criteria as parking area adequacy (minimum 250 spaces at grade), need for site grading, wetlands proximity, access to major arterial highways, residential impacts, development costs (including relocation costs), parcel assembly difficulties and station spacing. A preferred location was developed for each proposed station area. The Worcester service assumed new intermediate stations at North Grafton, Westborough and Ashland, the Marlborough service new intermediate stations at North Framingham, West Framingham, Southborough Center and Southborough/I-495, and the Milford service new intermediate stations at East Holliston and Holliston. See Figure 4.1-1.

The Feasibility Study assembled these services into four rail/bus alternatives and a bus-only alternative.

Rail Alternative #1 was new Worcester/Boston commuter rail service, with Marlborough/Boston express bus service during the commuter peaks, and semi-express service during the commuter peaks for Worcester, Shrewsbury and Westborough. No expansion was assumed in existing private Worcester express service. Rail Alternative #2 was Rail Alternative #1 plus peak hour Milford/Boston commuter rail service only, with shuttle bus service along the Milford route between Framingham and Milford in off-peak times. Existing private bus service for Milford was assumed to end at Medway because of the diversion of Milford patrons to the improved and extended Franklin rail line. Rail Alternative #3 was Marlborough service plus Milford service. Trains would make all stops to Framingham; then, for a given departure interval, the train from or to Milford would proceed as an express, and the train from or to Marlborough as a local, or vice versa. Existing Milford buses would run only to Medway, as above; the Marlborough/Southborough/Boston route would be dropped. Existing Peter Pan service along Route 9 and the Massachusetts Turnpike was assumed to operate as at present. Rail Alternative #4 was new Marlborough service only; local beyond Framingham at all times, but express between Boston and Framingham for peak commuting times. The Marlborough/Southborough/Boston route would be dropped. Existing Peter Pan service along Route 9 and the Massachusetts Turnpike was assumed to operate as at the time of the study.

The Bus Alternative assumed no expanded commuter rail service, and enhancements of existing bus service for Worcester/Shrewsbury/Westborough, for Marlborough/Hudson/Southborough, and for Milford. These enhancements



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 6 Miles

0 6

FEASIBILITY STUDY
ALTERNATIVE LINES / STATIONS

FIGURE 4.1-1

concentrate on upgrading peak hour service to 30 minute headways at a minimum, with auxiliary park-and-ride lots to concentrate patrons and reduce stopping time. Since Milford service is assumed because the Franklin line is part of the "No Build" condition, expanded service would end at Medway.

Service Areas and Ridership

The service area boundaries for all three rail lines under consideration were, roughly, Spencer on the west, Framingham on the east, the Fitchburg MBTA commuter line communities to the north, and the Franklin MBTA commuter line communities to the south–31 communities in all. The chief focus of the Feasibility Study's ridership estimates was commutes to Boston from these communities, projected to comprise–based on experience at other MBTA commuter rail lines–about 90% of total ridership and about 95% of peak hour ridership. Estimates of these commutes for 1987 and 2010 were based on information developed by the Boston Metropolitan Planning Organization (MPO) for the Commonwealth's Central Transportation Planning Staff (CTPS) on commutes to Boston from eastern Massachusetts as well as from communities in New Hampshire, Maine, Rhode Island and Connecticut. Some of this information came from the journey-to-work surveys of the 1980 U.S. census, some from analyses for the Central Artery/Third Harbor Tunnel project, and some from other socioeconomic data concerning the relevant cities and towns.

The Feasibility Study estimated work trips to downtown Boston from the 31 projected service area communities to be 7,060 in 1987, growing to 10,130 in 2010, about a 43% increase. The corresponding population for 1987 was 553,160, and for 2010 an estimated 582,340–a 5.2% increase. See Table 4.1-1. For the Worcester line's projected 19 service area communities, there were an estimated 2,800 trips to Boston in 1987, and 4,130 trips were projected for 2010, a 47% increase. For the Marlborough line's 9 projected service area communities, there were estimated 4,670 trips to Boston in 1987, and 6,640 trips were projected for 2010, a 42% increase. For the Milford line's 4 projected service area communities, there were an estimated 650 trips to Boston in 1987, and 930 trips were projected for 2010, a 43% increase. (The overall trips-to-Boston figures are slightly lower than the sum of separate estimates for the three services being considered because that sum double-counts potential riders from several communities which more than one line could service.)

Using these estimates of total trips to downtown Boston from the service area, the Feasibility Study proceeded to estimate how many of them might use each of the rail lines or the bus alternatives under consideration, assuming certain transportation networks and mode choice factors. For 1987, the Worcester area highway network was added to the CTPS model for metropolitan Boston, and necessary empirical data

Table 4.1-1 Worcester Commuter Rail Extension Study Area

City/Town	Est. 1987 Population	Est. 2010 Population	Est. 1987 Work Trips to Downtown	Est. 2010 Work Trips to Downtown
Framingham	63800	65100	2640	3710
Sudbury	14120	14000	700	960
Ashland	11200	14000	170	290
Holliston	12950	14000	300	440
Medway	9500	10810	210	330
Mendon	3530	4150	30	40
Hopedale	3980	4060	20	30
Milford	24280	24480	320	450
Hopkinton	8700	9400	210	310
Southborough	6430	7700	210	350
Marlborough	31150	35250	360	570
Hudson	17700	18250	100	150
Berlin	2230	2250	40	50
Northborough	11340	11620	120	170
Westborough	13100	13600	290	370
Upton	4300	4910	30	40
Northbridge	12450	12750	20	30
Grafton	11900	13620	30	50
Shrewsbury	22590	23120	160	250
Boylston	3540	3630	20	30
W. Boylston	6030	5660	10	10
Worcester	166000	170000	780	1030
Millbury	11820	11460	30	40
Sutton	6600	8360	30	50
Oxford	12370	12960	50	80
Auburn	14400	14400	30	80
Leicester	9650	10090	40	60
Paxton	3830	3820	20	20
Holden	13770	14090	20	30
Spencer	11600	12480	50	80
Charlton	8300	12320	20	30
TOTAL	**553,160**	**582,340**	**7,060**	**10,130**

on traffic flows for the highway links added. The 2010 network used the 1987 baseline and assumed as well completion of the Central Artery/Third Harbor Tunnel, the Franklin line to Milford, and, depending on the alternative analyzed, peak hour express bus to Worcester and Marlborough. Mode choice factors, which are assembled in a model which projects trips by mode, address issues like travel time, travel distance, and travel cost.

The results are shown in Table 4.1-2, which reflects both work and non-work trips for 2010. Rail Alternative #3, Marlborough and Milford service, is projected to attract the largest number of passengers overall, 3,860. Rail Alternative #2, Worcester and Milford service, attracts the largest number of commuter rail passengers, with Rail Alternative #3 close behind. The Bus Alternative never attracts as many riders as any rail alternative. Under Rail Alternative #1 and Rail Alternative #2, higher commuter rail speeds make for essentially negligible use of the assumed parallel bus services. Under Rail Alternative #3 and #4, bus services for Worcester service communities are estimated to attract the overwhelmingly bulk of projected bus riders, about 950 of them each.

Costs and Revenues

The Feasibility Study compared the rail alternatives and the bus alternative on the basis of their projected costs, capital and operating, and projected revenues. Each of these projections is based on complex assumptions reviewed in detail in the Feasibility Study.

Capital costs are for required rolling stock to meet projected schedules, but corrected for the melding of existing Framingham service with proposed new alternatives; stations, including site acquisition, relocation costs where applicable, and construction; and right-of-way improvements. Table 4.1-3 details the Feasibility Study's estimated capital costs in 1989 dollars. To these costs have been added a 20% contingency and 15% for engineering, applied to right-of-way and station costs only. Rail Alternative #1 is the cheapest; Rail Alternatives #2 and #3 are closely comparable and the most expensive; and Alternative #4 is in the middle.

Annual operating and maintenance (O&M) costs are also net, corrected for Framingham costs made redundant by the various new services. See Table 4.1-4. Plainly, in significant part, annual O&M costs for the various alternatives are dependent on needed rolling stock. Simply on the numbers, new service to only one destination is, not surprisingly, cheaper than combined services. Overall, Rail Alternative #4, Marlborough service only, is the cheapest, at $4.33 million per year,

Table 4.1-2 Total Rail and Bus Boardings - Year 2010

Daily Inbound Person Trips					
Station	**Bus Alt.**	**Alt. 1 2010**	**Alt. 2 2010**	**Alt. 3 2010**	**Alt. 4 2010**
Framingham		1230	1230		
Ashland		630	360		
Westborough		920	920		
North Grafton		120	120		
Worcester		880	880		
Framingham				1320	1620
Salem End Rd.				810	820
California Ave.				550	550
Main Street				180	180
Northboro Rd.				580	730
East Holliston			430	460	
Holliston			130	150	
Milford			180	180	
Rail Subtotal*	0	2550	3020	2910	2280
Bus Subtotal	1530	40	40	950	950
TOTAL*	**1530**	**2590**	**3060**	**3860**	**3230**

** Framingham Station excluded*

Table 4.1-3 Summary of Capital Costs (1990 Feasibility Study Estimates)

Category	Alternative No. 1 Worcester City	Alternative No. 2 Worcester/ Milford	Alternative No. 3 Marlborough/ Milford	Alternative No. 4 Marlborough Only
Right-of-way Improvements (includes bridges and culverts)	$10,909,000	$25,970,000	$27,786,000	$12,968,000
Stations	20,200,100	23,847,200	21,346,500	18,943,800
Rolling Stock ($1.34M trailer, $1.47M control car, $2.3M engine)	34,680,000	38,700,000	39,790,000	41,380,000
Subtotal	65,789,100	88,517,200	88,922,500	73,291,800
Contingency (@20%)	6,221,800	9,963,400	9,862,500	6,382,400
Engineering (@15%)	4,666,400	7,472,600	7,369,900	4,786,800
TOTAL	**$76,677,300**	**$105,953,200**	**$106,154,900**	**$84,461,000**

Table 4.1-4 Rail Operating and Maintenance Costs (1990 Feasibility Study Estimates)

Measure	Alternative No. 1 Worcester Express	Alternative No. 2 Worcester/ Milford	Alternative No. 3 Marlborough/ Milford	Alternative No. 4 Marlborough Express
Annual O&M Cost Estimate				
Annual O&M Cost of New Service	$6,330,000	$11,540,000	$10,760,000	$5,580,000
Annual O&M Cost of Framingham Service	$1,250,000	$4,470,000	$4,470,000	$1,250,000
Annual O&M Cost of Extension	$5,080,000	$7,070,000	$6,290,000	$4,330,000
Unit Costs of Service				
Cost Per Passenger	$4.33	$4.98	$4.46	$3.50
Cost/Rev. Train Mile	$22.86	$27.17	$32.60	$35.82

and Rail Alternative #1, Worcester service only, is next cheapest, at $5.08 million per year. The combined services are significantly more expensive–Rail Alternative #3, Marlborough/Milford, is $6.29 million, and Worcester/Milford is $7.07 million.

Annual net O&M costs are the basis for two further Feasibility Study calculations for the rail alternatives, cost per passenger and cost per revenue train mile. See also Table 4.1-4. Cost per passenger is the quotient of annual O&M costs divided by net annual passengers inbound and outbound. Annual O&M costs net out costs of Framingham service-peak and off-peak for Rail Alternatives #2 and #3, off-peak only for Rail Alternative #1 and #4-made redundant by the proposed new service. Cost per revenue train mile, which also nets out certain Framingham costs, is the quotient of annual net O&M divided by net revenue train miles. A revenue train mile is a mile for which revenue is collected. Here the Worcester commuter service, Rail Alternative #1, is plainly superior, though the other single-destination service, Marlborough-only, Rail Alternative #4, is the most expensive, with the combined services of Rail Alternative #2 and Rail Alternative #3 in the middle, though not particularly close.

Besides the rail alternatives, costs for the Bus Alternative and the express bus services associated with the four rail alternatives were also developed in the Feasibility Study. Local services were, for costing purposes, deemed not integral to the analysis, and, in any case, likely to be marginal. The Bus Alternative costs appear in Table 4.1-5. Cost per passenger is $1.96, and per revenue bus mile $2.22. Because the ridership forecasting model assigned no trips to the Worcester express bus service under Rail Alternative #1 and #2, no costs were calculated for this service, but for Rail Alternative #3 and #4, the cost per passenger is $2.23, and cost per revenue bus mile $2.06.

Cost Effectiveness

Overall cost comparisons can now be developed for the four rail alternatives and the Bus Alternative. In terms of total annual net O&M cost, the Bus Alternative is the cheapest overall, but Alternative #1 is the cheapest among the rail alternatives. See Table 4.1-6. In terms of cost per passenger comparisons, the Bus Alternative is the cheapest per passenger, but serves, by far, the fewest passengers, as Table 4.1-2 shows. Rail Alternative #4 has the lowest cost per passenger, Rail Alternative #1 the second highest cost. It needs to be kept in mind that these are out-of-pocket costs, but not necessarily MBTA costs, that are being analyzed. The MBTA would pay for commuter rail costs, but not for much of the express bus costs, since these are offered, for the most part, by private sector companies.

Table 4.1-5 Bus Operating and Maintenance Costs (1990 Feasibility Study Estimates)

Measure	Bus Alternative	Alternative No. 3 and 4 Worcester Express
Revenue Bus Miles	691,637	518,636
Annual IB Passengers	391,870	239,330
Annual Passengers (IB & OB)	783,740	478,660
Annual Bus O&M Cost of (in million$)	$1.53	$1.07
Cost Per Passenger	$1.96	$2.23
Cost/Revenue Bus Mile	$2.22	$2.06
Pass./Revenue Bus Mile	1.13	0.92

Table 4.1-6 Total Operating and Maintenance Costs (1990 Feasibility Study Estimates)

Measure	Bus Alternative	Alternative No. 1 Worcester Express	Alternative No. 2 Worcester/ Milford	Alternative No. 3 Marlborough /Milford	Alternative No. 4 Marlborough Express
Passengers					
Annual Rail Passenger (IB+OB)		1,172,980	1,420,200	1,409,680	1,236,100
Annual Bus Passengers (IB+OB)	783,740	0	0	478,660	478,660
Total Passengers	783,740	1,172,980	1,420,200	1,888,340	1,714,760
O&M Costs					
Net Rail O&M Cost (in million$)		$5.08	$7.07	$6.29	$4.33
Bus O&M Cost (in million$)	$1.53	$0.00	$0.00	$1.07	$1.07
Total O&M Cost	$1.53	$5.08	$7.07	$7.36	$5.40
Unit Costs					
Cost per Passenger	$1.96	$4.33	$4.98	$3.90	$3.15

The cost analysis can be brought full circle by determining the net annual costs of the various alternatives considered in the Feasibility Study. Net annual cost is the sum of net annual operating costs and annualized capital costs. Any capital cost can be annualized by dividing its separately costed elements by their respective life expectancies in years, though this plainly does not consider interest costs and inflation. The Feasibility Study estimates life expectancies for various project components as they are used in the various rail alternatives. In the Feasibility Study, Rail Alternative #1, Worcester commuter service, has the lowest net annual cost among the rail alternatives. See Table 4.1-7. The Bus Alternative has a considerably lower annual cost, $2.2 million, but the Feasibility Study did not provide revenue estimates for this option, so net annual cost cannot be calculated.

The ultimately favorable cost/benefit performance of Rail Alternative #1, among the rail alternatives considered in the Feasibility Study, is based on its particularly good estimated revenues, as shown in Table 4.1-7. Because the Worcester commuter service extends farther from Boston, it involves more zones with progressively higher associated fares per zone than the relatively short services to Marlborough or to Milford. The longer runs lead to higher revenues.

Section 3.6 contains, in Table 3.6-3, the annual net cost of the proposed project, as opposed to the Worcester service considered in the Feasibility Study. The annual net cost calculation made in Table 3.6-3 has suggested the need to recalculate for this DEIR the annualized capital cost figures given for the four rail alternatives in the Feasibility Study, using raw data from the Feasibility Study. The results still favor Rail Alternative #1 among the rail alternatives. See Table 4.1-8. Although it is not possible, using the Feasibility Study, to assess the net annual cost of the Bus Alternative, this recalculation of annual net cost for the rail alternatives certainly reduces the disparity between rail and bus options for enhanced Worcester commuter service.

Table 4.1-7 Net Annual Cost of Rail Alternative (Feasibility Study Estimates)

	Alternative No. 1	Alternative No. 2	Alternative No. 3	Alternative No. 4
Annualized Capital Cost	$13,640,000	$14,770,000	$12,430,000	$13,270,000
Annual Operating Cost	5,080,000	7,070,000	6,290,000	4,330,000
Total Annual Cost	18,720,000	21,840,000	18,720,000	17,600,000
Annual Revenues	3,820,000	4,940,000	2,620,000	1,700,000
Net Annual Cost	$14,900,000	$16,900,000	$16,100,000	$15,900,000

Table 4.1-8 Recalculated Net Annual Cost of Rail Alternatives

	Alternative No. 1	Alternative No. 2	Alternative No. 3	Alternative No. 4
Annualized Capital Cost	$2,270,000	$3,000,000	$3,020,000	$2,550,000
Annual Operating Cost	5,080,000	7,070,000	6,290,000	4,330,000
Total Annual Cost	7,350,000	10,070,000	9,310,000	6,880,000
Annual Revenues	3,820,000	4,940,000	2,620,000	1,700,000
Net Annual Cost	$3,530,000	$5,130,000	$6,690,000	$5,180,000

4.2 Commuter Bus Service Alternative

The DEIR evaluated a more comprehensive commuter bus service alternative, than was considered in the Feasibility Study. The performance standard for this alternative was to approximate, by means of peak hour express and off peak semi-express bus service, the commuter rail services proposed by the preferred alternative at its respective stations. Under this alternative, several elements of the preferred

alternative go away, but several remain. The elements not needed are the layover facility, much of the station work, and all track and signal work. The elements remaining are all parking lots, lighting, some platforms with shelters for bus boarding, all approaches to the parking lots, and most drainage facilities. As discussed below under "No Build", Section 4.3, track depression work would still happen, as part of the Conrail freight line upgrade, as would bridge replacements or demolition planned by the Massachusetts Highway Department.

Impacts

One of the key issues in comparing the commuter bus service and commuter rail service alternatives is relative regional air quality impacts. These are discussed in detail in Section 5.0.

Many of the impacts described in the DEIR will continue, never greater than described and in many instances somewhat less than described. Local traffic impacts, localized air quality impacts from traffic, and traffic mitigation will be as discussed in the DEIR's several station chapters, since the same volume of patronage for the commuter bus alternative is assumed. The incremental bus traffic is at all time de minimis. Most projected drainage impacts will continue, since the areas giving rise to the largest drainage impacts will be the parking lots, which will remain as sized for commuter rail service. Most of the wetlands impacts described in DEIR's station sections will continue, as the main source of wetlands impacts identified was the placement of parking lots in wetland buffer zones, and, again, the parking lots will remain as sized for the commuter rail project.

Nonetheless, other project impacts should go away, for example from noise and vibration, which is chiefly traceable to the project's incremental trains beyond the existing freight and intercity passenger trains. Visual impacts would be diminished in the daytime, since the rail station platforms as proposed will not be built and any shelter provided for the commuter bus service alternative would likely be substantially smaller in scale. Impacts from nighttime lighting would remain, but these should be minimal, for reasons discussed in the various sections on the proposed new intermediate stations. Construction impacts should be diminished, again because the proposed rail station platforms would not be built, but there will be impacts from the construction of the access roads, sidewalks, parking lot, and needed drainage facilities, as well as from any shelter that the MBTA might provide.

Costs

The net annual cost for the commuter bus service alternative has been estimated, so it can be compared with the project's net annual cost estimate presented in Table 3.6-3. The estimates of the commuter rail's capital costs in Table 3.6-1 of this DEIR have been used as the basis for estimating annualized capital costs, using the many elements of the commuter rail project, including land acquisition, parking lot development and site drainage, which will also be part of the commuter bus service alternative. Also, the Feasibility Study's estimate of 12 years was used as the measure of a bus's life expectancy, since Feasibility Study estimate for all other life expectancies have been used in estimating annualized capital costs in the DEIR. The commuter bus alternative would require approximately 57 buses costing approximately $275,000 each, or $15,675,000 all told. The results are in Table 4.2-1. The annualized capital cost then is used as an element in the net annual cost estimate. The estimate in Section 3.6 of revenues from the commuter rail project will be used for the commuter bus service alternative as well. Existing data on MBTA express buses was used to estimate O&M costs for the required commuter bus service fleet. The results are in Table 4.2-2.

Table 4.2-1 Annualized Capital Cost for Commuter Bus Alternative

Capital Element	Year's Life Expectancy	Cost	Annual Cost
Land	100	$5,000,000	$50,000
Parking Facilities	30	7,700,000	256,666
Buses (57 @ $275,000)	12	15,675,000	1,306,250
TOTAL		**$28,375,000**	**$1,612,916**

Table 4.2-2 Net Annual Cost of Commuter Bus Alternative

Annualized Capital Cost	$1,612,916
Annual Operating Cost (Buses only)	1,624,000
Total Annual Cost	3,236,916
Annual Revenues	5,000,000
Net Annual Cost	$(1,763,084)

4.3 No Build

With operations so complex as those on the existing Conrail right-of-way on which the project would operate, it is important to note that some activities discussed in the DEIR are very likely to happen in any case, and should be kept in mind when thinking about the difference between "No Build" and "Build" impacts. Among the very likely things that will happen are the lowering of tracks along the Conrail right-of-way beneath up to seven bridges, to achieve the required 20'-8" vertical clearance for freight, the reconstruction of four bridges over the Conrail right-of-way, and the demolition of one bridge over the right-of-way. The MHD will see to any required environmental review concerning the bridge reconstructions or demolition. Also likely to happen are construction of 1,500 Park'n'Ride parking spaces by the Massachusetts Turnpike Authority at various Turnpike exits, upgrade of approximately 4 miles of Route 146 in Worcester County from 2 lanes to 4 lanes, and a new Massachusetts Turnpike/Route 146/Route 20 interchange. Among the things that may well happen in any case are the reconstruction of missing track, and upgrading of other track, in the Conrail right-of-way as described in Section 3.1. These right-of-way impacts are being assessed in this DEIR.

Otherwise, without the project, impacts it is expected to avert will instead occur, and its impacts will instead be averted. Averted project impacts will be all those reviewed in Sections 7.0 and 10.0 through 19.0 of the DEIR.

"No Build" impacts include all the regional traffic impacts, and their concomitant air quality impacts, which will occur over time from additional cars taking to the roads. The major east-west highways which serve the Worcester Extension study area under "No Build" are U.S. Route 20, Route 9 and the Massachusetts Turnpike. Without the project there will be an additional 335 automobiles on Route 9 and 125 automobiles on the Turnpike west of I-495 during the morning peak travel period in 1996. Between Route 128 (I-95) and Boston, there will be an additional 130 peak period automobiles on Route 9 and 1,400 additional on the Turnpike. Similar numbers can be expected during the P.M. peak period. Projected further Turnpike crowding over time will only come sooner in time, since the Turnpike's own projections for the future assume the operation of the preferred alternative. Likewise, none of the project's air quality benefits will be realized. And an important transportation policy goal, of equalizing public transportation access to downtown Boston for the various regions in the metropolitan Boston area, will also fail of advancement, though, under "No Build", pressures on South Station will be eased somewhat without the project. Likewise, without a project, there will be no socio-economic impacts from it,

however small they might be, on land use, property values, or local revenues, or from MBTA assessment changes.

4.4 Conclusion--Preferred Alternative

In reviewing the impacts of the preferred alternative, the commuter bus service alternative, and "No Build", the MBTA has had to keep in mind not only these impacts and its policy goals for developing a regional transportation network, but the requirements of other state regulations and federal law. In particular, the MBTA must keep in mind the requirements of the Department of Environmental Protection (DEP) in its air quality regulations. These regulations, at 310 CMR 7.36 (2) (c)2., require that the Framingham/Worcester commuter rail extension be operational before December 31, 1996. DEP has proposed to the U.S. Environmental Protection Agency (EPA) that 310 CMR 7.36 in its entirety, and several other sections of DEP's air quality regulations, be included in the Commonwealth's State Implementation Plan (SIP) being revised in accordance with the requirements of 1990 amendments to the Federal Clean Air Act. EPA is expected to approve DEP's proposal, and once it does, the provision of any DEP regulation incorporated into the Massachusetts SIP become enforceable both by the DEP and by EPA.

Further provisions of 310 CMR 7.36 allow for the substitution of alternates to any project it lists, if the MBTA, acting through the Executive Office of Transportation and Construction (EOTC), can demonstrate that the project required by DEP regulation is "infeasible due to associated adverse engineering, environmental or economic impacts". This further provision appears to rule out the "No Build" option. Nor, based on the analyses presented in the remainder of this DEIR, is the project, because of engineering, environmental or economic impacts, infeasible. Instead, the proposed basic commuter rail service improves air quality over "No Build", and also serves long-standing MBTA policy goals around the development of a viable public transportation system which affords the various regions around Boston equal access to its downtown. Particularly in light of these latter goals, any project which also advances the air quality requirements of the Commonwealth should be welcomed.

SECTION 5.0 RIDERSHIP PROJECTIONS, REGIONAL TRAFFIC, AND AIR QUALITY IMPACTS

Preceding sections of the DEIR described existing transportation systems in the study area, the alternate modes of travel available, and demographic changes that highlighted the substantial increase in work trips to Boston and Cambridge originating in the project service area. This section provides an overview of the methodology employed to determine potential ridership for extension of commuter rail west of Framingham, a summary of ridership projection, and an analysis of the regional effects on traffic and air quality that would result from diversion of current automobile and other trips to commuter rail.

5.1 Ridership Projection Methodology

The services of the Central Transportation Planning Staff (CTPS), a research and planning arm of the Executive Office of Transportation and Construction, were employed to determine the project's likely service area, analyze overall transportation demand in that area, and determine the potential ridership for commuter rail. The following sections summarize the CTPS analyses; a fuller description of the methodology is contained in Appendix - Volume II, Section 2.

Travel forecasts were produced with the state-of-the-practice set of urban travel demand models used at CTPS for many other transportation forecasting projects during the last several years.

The CTPS travel demand models are a result of 25 years of urban transportation planning experience in the Boston metropolitan area. Earlier travel demand forecasting models have since been re-validated resulting in the confidence that these models can estimate travel patterns and transit ridership adequately in large metropolitan areas. These models are applied within the U.S. Department of Transportation—supported Urban Transportation Planning System (UTPS) software package. Over the past five years, the CTPS Transportation Systems Planning Group has performed a number of transit planning studies for the MBTA using its model set.

Some of these studies involved the estimation of future travel demand for proposed major transit capital improvement projects, such as the Circumferential Transit Feasibility Study, the South Boston Piers/Fort Point Channel Area Transit Study, and the Program for Mass Transportation.

The model simulates travel on the entire eastern Massachusetts transit and highway system. The model contains all MBTA rail and bus lines, and all private express bus lines; service frequency (i.e., how often trains and buses arrive at any given transit stop), routing, travel time and fares. In the highway system, all expressways and principal arterials are included, along with many minor arterial and local roadways.

The travel demand forecasting procedure used in this analysis is a somewhat simplified version of the traditional four-step, sequential process of trip generation, trip distribution, mode choice, and trip assignment. The eastern Massachusetts geographic area represented in the model is divided into several hundred smaller areas known as **traffic zones**. This model is used to estimate average daily transit ridership, primarily on the basis of forecasts of population and employment, projected highway travel conditions (including downtown parking costs), and projected transit service to be provided.

The following paragraphs describe very briefly the techniques employed in each of the four steps of the forecasting model.

Trip Generation

In this step, the model estimates how many trips are generated in each traffic zone using estimates of projected population and employment and other socioeconomic characteristics of that zone.

Trip Distribution

In this step, the model takes the total trips generated by each zone and distributes them to all the other zones in the study area based on a Newtonian principle of relative attractiveness. This creates a trip flow pattern.

Mode Choice

After the trip flow pattern is determined, the model estimates what proportion of the trip flow is by automobile and by transit mode. It uses the relative travel times and costs by automobile and transit to estimate these proportions.

Trip Assignment

In this final step, the model assigns the transit trips to different transit modes such as subway, commuter rail, local bus, express bus, etc. To do this, it uses the shortest transit path from one zone to another. This path may involve just one mode such as a local bus or multiple modes such as a local bus and a transfer to the subway line, etc. The automobile trips are assigned to the highway network and the resulting traffic volumes on all highway links are summarized.

5.2 Definition of Service Area

Several factors help determine the extent of the market area for a new commuter rail service. The majority of commuter rail trips are work trips. It follows that in defining a market area for proposed new commuter rail service, it is important to look first at how accessible the area currently is to the employment centers to which it will be connected by the new rail service. In the case of the proposed Worcester rail extension, those employment centers are Boston CBD and to a lesser extent Worcester and Cambridge. The level of accessibility usually is related to how strongly oriented the market area is to Boston, and the strength of that orientation is another important factor in determining the size of the market.

It is also necessary to consider existing transit services. Their locations may highlight areas which may be underserved by transit and provide boundaries for the potential market area for new service. The market size is also a function of the locations of proposed rail stations and the ease of access to those stations from surrounding communities.

The Boston CBD is an important employment center for residents of the I-90/I-495 area and Central Massachusetts. Trends in housing costs and labor availability during the 1980s have strengthened what in 1980 was already a strong economic relationship between Boston and this region. Continuation of these trends into the future combined with worsening auto commute travel times into Boston suggest that the market for rail service from Central Massachusetts and the I-90/I-495 region to Boston can be expected to grow.

In addition to the degree of Boston orientation and general accessibility, another important factor which helps to geographically define the market area for new Worcester rail service is that of existing transit service. The current Fitchburg Line,

with station stops in Littleton, Acton, and Concord, defines the northern edge of the market area. The Franklin Line, with its extension to Bellingham and Milford, defines the southern edge of the market area. The eastern boundary is defined by the service to Boston which exists from Framingham. Surveys of rail service in the Boston area have shown that people are willing to travel a limited distance to reach a rail station. This information, combined with 1980 and 1990 journey-to-work information from the U.S. census, which shows that there were few work trips to Boston from communities farther west than Spencer, helped to determine the western boundary of the market area. The geographic limits of the service area were shown previously in Figure 2.2-1.

Once the market area is defined geographically, it must be defined in terms of potential users of the proposed rail service. Recent surveys of Boston area rail lines have shown that approximately 90% of commuter rail trips are work trips and a big portion of these are to jobs in Boston. While there are many people who both live and work within the market area, it is unlikely that a significant proportion of them would be served by radial, Boston-oriented rail service. There probably are some people who, for example, live in Worcester and work in Framingham and could conceivably use the train to travel to and from work. However, few of them would likely be willing to drive or take a bus to the Worcester station, wait for the train, ride it to Framingham, then wait for a bus or other transportation to their places of employment, when they can drive from home to work in what is probably less total time. People who work in the market area can also, in most cases, park at work without much added cost or time. Traffic congestion between cities and towns in the market area is reasonable compared to congestion approaching Boston, and parking is much cheaper and more readily available than in Boston.

For these reasons the modeling procedure used to forecast rail ridership in this study was concerned primarily with work trips from the market area to Boston.

5.3 Ridership Projections

CTPS prepared ridership projections for three basic scenarios, in which it was assumed that demand at all stations would be unconstrained by parking capacity. A fourth analysis addressed the more realistic situation in which parking capacity at Southborough Station is constrained. The four analysis options are as follows:

Alternate 1 - Construction of stations in Worcester, Millbury, Grafton, Westborough, Southborough, and Ashland.

Alternate 2 - Same as Alternate 1, plus a regional station at I-495 in Westborough.

Alternate 3 - A series of projections assuming construction of pairs of stations, each pair defined by the Worcester Station and one of the other stations.

Alternate 4 - Same as Alternate 1, with parking constrained at Southborough only.

Between Alternates 3 and 4, the likely upper and lower volumes of patrons can be estimated, and from those volumes likely upper and lower bounds of traffic impacts from the project, both regionally and locally.

The ridership projections were prepared for four analysis years—1996, 2001, 2006, and 2011. In preparing the Draft Environmental Impact Report, station parking requirements are based on year 2011 ridership projections assuming all intermediate stations except the regional station are implemented, and parking is constrained at Southborough (Alternate 4 above).

For analysis of traffic impacts in the Year 1996, Alternates 3 and 4 were employed. Traffic impacts for the year 2001 are based on Alternate 4 only, since it is unrealistic to assume that only one intermediate station will be in service at that time. Ridership projections pertaining to the above analyses of traffic and parking are presented in Tables 5.3-1 and 5.3-2. The data for all of the ridership/station alternatives are contained in Appendix Volume II, Section 2.0.

As noted elsewhere in the DEIR, and described in detail in Section 17, a regional station at I-495 is not proposed as part of this current program, but remains a long-term goal. At Southborough, station parking capacity is constrained by site conditions and adjacent development. These issues not withstanding, construction of stations in Worcester and the intermediate stops is projected to attract 2,137 inbound weekday riders in 1996 and ridership is anticipated to increase to 2,701 inbound boardings by the year 2011 (Table 5.3-1).

Table 5.3-1 Ridership Projections - Worcester and Intermediate Stations - Alternate 4

Estimated Daily Inbound Commuter Rail Trips to Boston CBD and East Cambridge							
Year	Worcester	Millbury	Grafton	Westb.	Southb.	Ashland	Total
1996	369	148	116	216	550	738	2,137
2001	391	162	126	230	553	837	2,299
2006	421	178	136	240	550	962	2,487
2011	448	195	149	263	553	1,093	2,701

Table 5.3-2 Ridership Projections, 1996, Stations at Worcester and One Intermediate Station, Unconstrained Parking - Alternate 3

Estimated Daily Inbound Commuter Rail Trips to Boston CBD and East Cambridge	
Millbury	347
Grafton	444
Westborough	506
Southborough	636
Ashland	1,041

Ridership shown is that for a station in the named town assuming no stations in the other intermediate towns

5.4 Regional Transportation Impacts

Certain streets identified as likely routes to access the proposed commuter rail stations will experience an increase in traffic volumes during the peak hour of travel. These increases are addressed in the individual station sections of this document. Other streets which now provide access to major east-west routes, such as Route 20, Route 9 and the Massachusetts Turnpike, should experience at least a modest reduction in traffic volumes depending on the location of the proposed stations relative to the commuter town of origin. On the regional level, the extension of commuter rail to Worcester will produce a reduction in travel demand primarily on Route 9 and the Massachusetts Turnpike. Current traffic conditions on Route 9 and the Turnpike are rapidly becoming more congested.

In response to the Massachusetts Department of Environmental Protection's (DEP) air quality regulations, the Massachusetts Turnpike Authority (MTA) has been studying various improvements to address the growing congestion on the Boston extension of

the Turnpike. The studies centered on the need to improve air quality by employing HOV measures to control peak travel time so that the times do not exceed a 35% increase over baseline conditions. The MTA report, entitled "High Occupancy Vehicle Lane Feasibility Study," revised April 15, 1994, recommends the construction of 1,500 parking spaces in Park'n'Ride lots located between Interchange 10 in Auburn and Interchange 15 in Weston. The lots, if constructed by the year 2000, would provide the necessary relief until the year 2005 by removing 1,170 vehicles from the Boston extension of the Turnpike in the A.M. peak travel hour. The report forecasts that the Park'n'Ride improvements, plus a fully operational Worcester Commuter Rail Extension by 2005, will provide the necessary congestion relief and resultant air quality improvements through the year 2025.

The Park'n'Ride plan was developed to complement the Worcester Commuter Rail Extension, with little overlap between Park'n'Ride users and potential rail commuters. The timetable for the construction of the MTA's lots is to be coordinated with the proposed rail project.

A recent evaluation by the Central Transportation Planning Staff (CTPS), based on its study of mode choice and trip assignments of transit trips, reveals that the east-west roadway network would be affected in a positive manner by trips directed from auto to rail travel. An evaluation of the service area communities produced estimates of reduced auto travel on Route 9 and the Turnpike.

Using I-495 and Route 128 (I-95) as screen lines, CTPS employed various factors such as travel time, congestion, and costs in determining preference for travel routes. According to CTPS, implementation of the commuter rail project will result in a reduction of 335 automobiles on Route 9 and 125 automobiles on the Turnpike west of I-495 during the morning peak travel period in 1996. The reductions are shown in Table 5.3-3. Between I-495 and Route 128 (I-95), a similar evaluation results in a higher percentage of auto reduction for the Turnpike versus Route 9. The total reduction is much greater than west of I-495. Between Route 128 (I-95) and Boston, the shift of commuters to the train will result in 130 fewer peak period automobiles on Route 9 and 1,400 fewer on the Turnpike. The much larger segment of the total reduction (91%) of vehicles on the Turnpike clearly results in a favorable impact relative to improved traffic flow on the Boston extension. Similar reductions can be expected during the P.M. peak period.

Table 5.3-3 Reduction in Traffic Volumes During the A.M. Peak Period

Year	Between Worcester and I-495		Between I-495 and Route 129		Between Route 128 and Downtown Boston	
	Mass Pike	Route 9	Mass Pike	Route 9	Mass Pike	Route 9
1996	125	335	555	980	1,400	130
2001	130	350	620	1,020	1,510	135
2006	135	380	700	1,080	1,640	140
2011	140	400	780	1,140	1,770	150

Bus Routes

Bus routes currently providing travel between the project area and Boston will experience a decrease in ridership. Rail and bus operations may compete for some of the same riders. The choice between these two travel modes is based, among other things, upon convenience, flexibility, travel time, and out-of-pocket costs.

Based on the proposed rail extension operational plan, the travel time between the study area and Boston will be roughly equivalent between bus and rail modes. Both services offer parking facilities at the Worcester area end of the trip. The flexibility and convenience of the two services would be roughly equivalent, but ultimately depends on individual preferences or needs. The cost of round trip commuter rail would be lower than the cost of round trip bus travel. Based on these decision making parameters, the effect of the rail extension may be significant, especially on the Peter Pan Express Bus operations in the western section of the service area. Overall the rail extension is estimated to draw up to 15% of its ridership switching from buses. Although an initial impact on bus ridership may be anticipated, in the long-term successful parallel bus and rail service is projected. (For example, the City of Newton is serviced by commuter rail, MBTA Greenline, and Express Bus service from the Riverside station at the terminus of the Greenline.)

Vanpools and Carpools

Vanpools and carpools are also services that compete with rail service. The decision making criteria when choosing between vanpools/carpools and rail travel are similar to those in the choice between rail and bus travel. In this case, the vanpools and carpools have an advantage over rail travel. Vanpools and carpools typically provide "portal to portal" service because they are often arranged between people working at the same location. Upon arrival, the final portion of the commute trip, travel from the parking lot to the work site, is typically very short and very convenient.

The out of pocket costs of vanpools and carpools are typically lower than rail travel. Incentives such as the Massachusetts Turnpike reduced toll program add to this advantage. Based on the cost differential and the element of convenience, it is assumed that a relatively low number of vanpoolers and carpoolers will be attracted to the rail extension.

5.5 Regional Air Quality Impacts

Areawide Impacts of Trip Diversion to Commuter Rail

An analysis of the impacts of a mode shift from automobile to the Worcester Commuter Rail Extension under a "Build" scenario was conducted and compared to a "No Build" scenario in which these trips travel to downtown Boston via automobile for years 1996 and 2001. The ridership data used in this analysis was based on Central Transportation Planning Staff (CTPS) ridership projections (prepared in June 1994) which quantified commuter rail trips attracted to the various proposed stations for the Worcester Commuter Rail Extension.

This analysis calculates the regional round trip emissions produced by vehicles which would travel from the various towns of trip origin into Boston and compared these emissions with those produced by trips to the various Worcester Commuter Rail stations necessary to access the rail service. The difference between the emissions produced by auto trips into Boston under a "No Build" scenario and the emissions produced by trips accessing the commuter rail stations under a "Build" scenario is assumed to account for the regional air quality benefit of the commuter rail extension.

Because the CTPS data was based on person trips rather than vehicle trips, a conversion to vehicle trips was made using regional vehicle occupancy rates provided by CTPS. The analysis assumes that average vehicle occupancy for highway work trip travel is 1.2 and travel to park-and-ride facilities is 1.12.

For air quality analyses, CTPS ridership projections have been assumed to consist entirely of new riders; no diversion from existing bus operations is assumed. It was assumed that the emissions from auto trips to the Peter Pan bus stops were equivalent to those that would be produced by the same number of trips to the commuter rail stations. As a result, it was determined that there would be no air quality benefit from transferring bus riders to commuter rail and these ridership numbers were omitted.

This analysis is based on a system in which the trips to all the proposed stations (with the exception of the possible regional station) are included.

Average travel distances between trip origins and downtown Boston for the "No Build" scenario and between trip origins and the proposed commuter rail or express bus stations in the "Build" scenario were based on measurements of travel distances off of regional highway maps. Trips were assumed to originate from the town center and travel via primary and arterial roadways to their destination. All trips to downtown Boston were assumed to utilize the Massachusetts Turnpike from the nearest appropriate Turnpike entrance to its downtown terminus. Travel speeds were based on default speeds by highway functional class from the Federal Highway Administration's Highway Performance Monitoring System (HPMS), except for the section of the Turnpike located between Route 128 and downtown Boston. The vehicle speeds associated with this section were adjusted for both 1996 and 2001, to reflect the reduction in speed resulting from growth in VMT. The speed data were taken from the *High Occupancy Vehicle Lane Feasibility Study*, prepared by the Massachusetts Turnpike Authority, updated in April 1994. Because not all trips in reality are likely to utilize the Turnpike, thereby travelling at lower average travel speeds, these trips would be producing emissions at somewhat higher rates. Diversion of these trips to commuter rail would result in even greater emission reduction benefits.

A further adjustment used in the calculation of regional Vehicle Miles of Travel (VMT) was made to account for variation in the mode of access to the commuter rail stations. All park-and-ride trips were assumed to involve one trip out and one trip back to the town of origin. All kiss-and-ride trips were assumed to be two round trips to the station to account for drop-offs.

The results of the analysis are shown in Table 5.5-1. The total regional vehicle miles travelled will be reduced by more than 118,000 in year 1996 and more than 126,000 in year 2001. The VMT reductions in 1996 result in a net VOC reduction of more than 113 kilograms per day, a net NO_x reduction of more than 199 kilograms per day and a net CO reduction of more than 1,584 kilograms per day. The pollutant reductions in year 2001 are somewhat less due to better emission controls on most vehicles.

Table 5.5-1 Comparison of Daily Regional Emissions (Kilograms/day)

	No Build Town Ctr to Boston		Build Town Ctr to Station		Net Reduction	
	1996	2001	1996	2001	1996	2001
VMT	137,157	147,198	19,142	20,584	118,015	126,614
VOC (Kg)	133.35	101.19	19.57	14.09	113.78	87.10
NO_x (Kg)	230.53	190.25	30.87	25.68	199.66	164.57
CO (Kg)	1,853.67	1,339.75	269.34	177.53	1,584.34	1,162.21

* *VOC and NO_x emission rates are based on summer conditions. The CO emission rate is based on winter conditions.*

Emission Impacts on Peak Hour Massachusetts Turnpike Operations

Data for this analysis is taken from the *High Occupancy Vehicle Lane Feasibility Study*, prepared by the Massachusetts Turnpike Authority in August 1993 (revised April 1994). The data was used and adjusted as follows:

- 1996 and 2001 traffic volumes for the AM and PM peak hours were determined based on the 1990 base year data and the 2020 forecast.
- Speeds and Levels of Service for the turnpike segments were calculated by the FHWA's Highway Capacity Software, based on the Highway Capacity Manual. The assumptions are similar to those used for the HOV study analysis.
- The turnpike segments were used as defined in the HOV study.

The Worcester Commuter Rail ridership forecasts developed by CTPS show that in 1996 there will be 2,137 inbound person trips with 2,299 in 2001. These numbers were adjusted as follows:

- On average, one half of the trips are assumed to be from previous Mass. Turnpike users;
- One half of the previous Turnpike users are assumed to travel inbound during the peak period; and
- The occupancy rate is 1.2.

These adjustments provided a reduction of 445 vehicle trips inbound in 1996 and a reduction of 479 in 2001. (The same number of trips are subtracted from the P.M. westbound traffic.) Travel speeds on all segments of the Turnpike Extension will improve as a result of the implementation of the proposed commuter rail service.

The analysis completed previously accounted for the reduction in VMT resulting from the Worcester Commuter Rail Extension, however it did not cover the decrease in emissions associated with increased speeds for the remaining Turnpike users. To determine the emission benefits associated with the speed reductions, the "No Build" speed emission factors were applied to the "Build" VMT to compute total emissions. These figures were then compared to the total emissions of the "Build" scenario. The net benefits are shown in Table 5.5-2. Speed improvements per segment of the Turnpike Extension and related emissions are shown in Appendix Volume II, Section 6.0.

Table 5.5-2 Peak Hour Massachusetts Turnpike Extension Emissions

	With Commuter Rail Extension		With Commuter Rail Extension ("No Build" Emission Rates)		Net Benefit	
	1996	2001	1996	2001	1996	2001
VOC (Kg)	123.12	98.30	170.82	126.74	47.70	28.44
NO_x (Kg)	198.71	162.25	200.51	162.92	1.80	0.67
CO (Kg)	1,691.84	1,290.45	2,460.46	1,822.90	768.62	532.45

The cumulative effect of trip diversions and the improved speeds on the Turnpike Extension are shown in Table 5.5-3.

The cumulative effect of trip diversions plus the improved speeds on the Turnpike Extension are shown in Table 5.5-3.

Table 5.5-3 Net Reduction in Daily Emissions

	1996	2001
VOC (Kg)	161.48	115.54
NO_x (Kg)	201.46	165.24
CO (Kg)	2,352.96	1,694.66

Emission Comparison of Bus and Commuter Rail Operations

This section compares the emissions associated with the Expanded and Basic commuter rail services to a bus service alternative. Comparisons are made for years 1996 and 2001. The locomotive emission factors are held constant for these two time periods because data are not available as to how locomotive emissions may improve over time. The EPA's emission model Mobile 5a generated factors for heavy duty diesel vehicles are used for the bus calculations, consistent with conventional practice.

The following subsections define the assumptions used for these analyses as well as present the results.

Commuter Rail Assumptions

- The locomotive emission factors are based on the 16-645E3B engine, manufactured by EMD, which was tested in June 1978. This engine represents the proposed locomotives for operation on the Worcester Extension. The emission factors themselves are based on the report, Locomotive Emission Study, prepared for the California Air Resources Board by Booz, Allen & Hamilton Inc.

- The locomotive emission factors are adjusted to account for typical service consisting of local and express segments. Non-stop route segments from Worcester to Framingham and Framingham to Boston are categorized as express. The engine emission factors are adjusted to reflect specific profiles provided by the Locomotive Emissions Study. (Industry Standard Profile for EMD Medium Road Duty for express service and Local Service Throttle Profile for local service).

- The extended service that is included in the calculations consists only of new service. For example, existing service to Framingham which extends its route to include the additional stations only contributes the incremental pollutants emitted between Framingham and Worcester, whereas entirely new trains added to the schedule account for additional emissions between Framingham and Boston as well as between Framingham and Worcester.

- The above explanations apply to both the Basic and Expanded commuter rail alternatives.

Bus Alternative Assumptions

- The Bus Alternative is assumed to generate the same level of demand as the commuter rail extension, and will originate service at each of the proposed commuter rail stations. Peak period service assumes buses departing from each station with express service to Boston; off-peak trips consist of buses serving 3 stations grouped as follows:

Ashland-Southborough-Westborough; and Grafton-Millbury-Worcester.

- The emission rates for the buses are based on the EPA's Mobile 5a Heavy Duty Diesel Vehicle (HDDV) rates for both 1996 and 2001.

- For the alternative bus service there are 57 inbound and 59 outbound peak period buses in 1996 and 59 inbound and 61 outbound in 2001 for both expanded and

basic service. Off peak service consists of 12 inbound and 12 outbound in 1996 and 2001 for basic service and 24 inbound and 24 outbound in 1996 and 2001 for expanded service.

- One dead head (empty) bus is assumed to exist for each station, both in the AM peak and the PM peak.
- Bus mileage (VMT) is calculated based on the distances calculated for the auto emission analysis with adjustments made for the off peak service to multiple stations.

Analysis Results

The results of this analysis are shown in Table 5.5-4. In both the expanded and basic service alternatives the locomotive NO_x emissions exceed those of the buses. The VOC emissions are very close, with the rail alternative being higher in the expanded service and the bus alternative being higher under the basic service scenario. The CO emissions are greater for the buses in both scenarios.

Table 5.5-4 Pollutant Emissions* (kg/day) Comparison of Buses versus Trains

	VOC		NO_x		CO	
	1996	2001	1996	2001	1996	2001
Basis Train	6.13	6.13	210.21	210.21	21.76	21.76
Basic Bus	7.47	7.56	58.54	46.23	34.72	37.06
Expanded Train	9.38	9.38	322.76	322.76	33.11	33.11
Expanded Bus	9.05	9.12	70.68	55.78	41.98	44.64

* *Rail emission rates are based on tests conducted in June 1978 and are held constant from 1996 to 2001. VOC and NO_x Bus emissions are based on summer conditions; CO emissions are based on winter conditions.*

Table 5.5-5 presents the combined emission reductions of auto trip diversions and increased Turnpike speeds, with total net reductions (or addition of emissions) due to Basic and Expanded train and bus service. The net CO emissions are greatly influenced by the auto trip diversion and improved Turnpike Extension operation, with only minor additions due to train or bus operations. The State Implementation Plan (SIP) for the attainment of National Ambient Air Quality Standards targets CO emissions as "hot spots" on the microscale level. The SIP does focus on reducing VOC emissions between now and 1996. All combinations in Table 5.5-5 reflect net reductions. After 1996, the SIP in expected to focus on the reduction of combined VOC and NO_x. The combination of VOC and NO_x undergo photochemical oxidation

(in the presence of sunlight) to form ozone (O_3). The oxidation process occurs over a period of time at a metropolitan or regional scale and is a function of the transport of the pollutants over potentially long distances and long periods of time. The region has a non-attainment status for O_3.

Table 5.5-5 Net Reduction in Regional Emissions*

	VOC (Kg/day)		NO_x (Kg/day)		CO (Kg/day)	
	1996	**2001**	**1996**	**2001**	**1996**	**2001**
Auto Trip Diversions	-113.78	-87.10	-199.66	-164.57	-1,584.37	-1,162.21
Increased Turnpike Speeds	-47.70	-28.44	-1.8	-0.67	-768.62	-532.45
Subtotal	**-161.48**	**-115.54**	**-201.46**	**-165.24**	**-2,352.96**	**-1,694.66**
Basic Train Service	+6.13	+6.13	+210.21	+210.21	+21.76	+21.76
Total	**-155.35**	**-109.41**	**+8.75**	**+44.97**	**-2,331.23**	**-1,672.90**
Basic Bus Service	+7.47	+7.56	+58.54	+46.23	+34.72	+37.06
Total	**-154.01**	**-107.98**	**-142.92**	**-119.01**	**-2,318.27**	**-1,657.60**
Expanded Train Service	+9.38	+9.38	+322.76	+322.76	+33.11	+33.11
Total	**-152.10**	**-106.16**	**+121.30**	**+157.52**	**-2,319.88**	**-1,661.55**
Expanded Bus Service	+9.05	+9.12	+70.68	+55.78	+41.98	+44.64
Total	**-152.43**	**-106.42**	**-130.78**	**-109.46**	**-2,311.01**	**-1,650.02**

* *Minus (-) sign indicates a reduction in emissions; Plus (+) sign indicates an addition in emissions.*

The reactivity of VOC and NO_x is a complex process which is being studied by the EPA and the Massachusetts DEP. The ratio of combination of the individual pollutants has not been established with any certainty, although the current baseline inventory reveals that VOCs and NO_xs exist in the atmosphere in approximately equal proportions. The sum of the VOC and NO_x emissions in Table 5.5-5 indicate that a total net reduction would occur for all scenarios addressed, except expanded train service in 2001.

Implementation of commuter rail service to Worcester and intermediate towns is contained as a project in both the air quality State Implementation Plan (SIP) and the conforming Transportation Improvement Program (TIP) that is required under provisions of the Clean Air Act Amendments of 1990. In addition, the project is in compliance with the applicable project-level requirements for air quality conformity as promulgated in the Environmental Projection Agency's Rulemaking of November 15, 1993.

The Amendment to the State Implementation Plan that is due on November 15, 1994 must demonstrate a 9 percent decrease in VOC emissions between 1996 and the ozone attainment year of 1999 for Massachusetts. This corresponds to a decrease of 3 percent per year for this three year period. EPA has ruled that for the purpose of this SIP submission, a one percent reduction in emissions of NO_x can be substituted for a one percent reduction in VOC emissions. The proposed commuter rail improvements result in a net reduction of NO_x and VOC emissions, consistent with the requirements of the 1994 ozone SIP submission.

SECTION 6.0 SOCIO-ECONOMIC IMPACTS

This chapter addresses questions raised about possible socio-economic effects which might result from the project. These questions have centered on possible project effects from or on the following:

- induced development and land use
- property values
- local revenues
- construction and operating costs and revenues
- MBTA assessments.

In general, the project is not expected to have any significant long-term adverse effects on any of these dimensions. Induced development effects are likely to be minimal, and in any case any induced development is chiefly under the control of each of the project community's local authorities. Property values, even close to the rail lines, are not likely to be affected adversely, and may well be positively affected. Local revenues may be slightly affected by the removal of private property from the local tax rolls. Construction costs are well within the MBTA's financial capabilities, and the recovery of operating cost through revenue for the project is better than for other commuter rail projects in the Boston metropolitan area. Small assessment increases are likely for Ashland and Framingham; however, the project has no current assessment impacts on the other project communities (which are not within the MBTA district), and has no predictable future effects on the other project communities.

6.1 Induced Development and Land Use

The project will restore railroad service suspended in 1975 between Massachusetts's two largest cities, Boston and Worcester. The project's service area has seen substantial population growth and commercial development over the last thirty years, as people and commerce have moved away from the urban core of and around Boston, influenced by the availability of cheaper land for new housing, and improved radial and circumferential highways. Accompanying these, there has been growth of

employment in certain critical zones outside the urban core where these radial and circumferential highways intersect—although, at least in Boston, there is also growing employment in the urban core itself. The total population within the project's service area grew from 456,954 in 1980 to 491,771 in 1990, nearly an 8% increase for the decade (See Table 2.3-1). Total employment within the project's service area grew from 188,713 in 1980 to 216,946 in 1990, a 15% rate of growth for the decade, or nearly double the rate of population growth. See Table 2.3-2.

The chief influences on development and land use in the project's service area are the interacting effects on population movement, housing development, and commercial development of the dramatically improved mobility and access provided by its major new highways—I-495, I-90, and I-290 linking Worcester to both of these. Population in Worcester County between 1980 and 1990 grew by 9.8 per cent, according to the Central Massachusetts Regional Planning Commission—more than in the service area. Nonetheless many of the demographic pressures are ebbing. Projections for the service area are for a modest 1 percent growth by the year 2000, based on projections by the Metropolitan Area Planning Council (MAPC) for service area communities in the MAPC area and by the University of Massachusetts's Massachusetts Institute for Social and Economic Research (MISER) for other service area communities. And any figures through 1990 must be taken in the context of essentially flat population growth in Massachusetts for some time, suggesting that much of Worcester County's growth represents reallocation of population within Massachusetts, as individuals and businesses seek cheaper land and less burdensome access for housing, offices, and industry.

Nonetheless, for all the population growth in the service area and the employment growth between Route 128 and I-495, especially along their critical connecting corridors of Route 9 and I-90, Boston is still a major work destination for those living in the service area. Data compiled by the Central Massachusetts Regional Planning Commission from the U.S. Census of 1990 reveals that, while population in Worcester County grew by 9.8 per cent between 1980 and 1990, total work trips from Worcester County to the City of Boston increased from 2,660 in 1980 to 5,029 in 1990, an increase of 89 percent. In the service area communities, these works trips increased 63 percent between 1980 and 1990. Notable is the number of communities from which no commuters came in 1980 but from which commuters come in 1990. (See Table 2.3-4). In general, Table 2.3-4 suggests the ongoing integration into the Boston labor market even of residents in communities once almost exclusively within the Worcester orbit. This integration is reflected in the recent inclusion for the first time, by the U.S. Bureau of the Census, of the Worcester Primary Metropolitan Statistical Area (PMSA) into a new Boston-Worcester-Lawrence

MA-NH-ME-CT conglomeration called a Consolidated Metropolitan Statistical Area (CMSA). Federal census researchers have justified the change on the basis of population density, commuting patterns, and other regional relationships.

Proximity to downtown Boston and Cambridge employment is thus an increasingly important location advantage for residents of and owners of rental units in communities in the service area, which is on the western reaches of the area roughly within one hour's commute of Boston, and well served, at least for the moment, by I-90 for that commute. Nonetheless, how this location advantage manifests itself in local development is under the nearly exclusive control of local governing bodies which regulate matters like zoning and wetlands. Communities can encourage residential development, commercial development, neither or both.

Worcester County's and the service area's demographic dynamics notwithstanding, the project is not likely to have or to create significant development effects. Its main goal is shifting automobile commuters in the service area to commuter rail, so as to preserve existing levels of access between the service area communities and the urban core, access which is threatened by increasing traffic congestion on key radial highways between the service area and Boston, most importantly I-90. This shifting is not likely, independently, to create or to foreclose significant development opportunities, given the numbers involved, even though these numbers will yield, as discussion elsewhere shows, reduced road congestion and favorable environmental impacts. Instead, development opportunities will, as without the project, be chiefly created by the complex dynamics of job-creating investment in Boston and in the rapidly developing commercial and industrial areas between Route 128 and I-495 and the Route 9 and I-90 corridors linking them. Nonetheless, there may be a marginal impact on development, particularly housing development, since the project makes the area more attractive to those who work in Boston—the single largest market of employed persons in Eastern Massachusetts, and an affluent market as well.

6.2 Property Values

The project's potential property value impacts should be distinguished into line impacts and station-area impacts.

The project's line impacts on property values are likely to be negligible. While commuter rail service between Worcester and Framingham has not operated since

1975, other Amtrak passenger service has continued, as has freight service, to this day. The Amtrak service currently involves 7 trains per day. Freight service is around-the-clock. The incremental line impacts from the project's additional daily commuter trains are unlikely to cause a potential buyer to value a given property any differently than existing train impacts would. Indeed, the MBTA determined, in its review of line impacts from new Old Colony service, that adverse property value impacts were not likely. This is significant since the new Old Colony service is not being added onto an existing base of train impacts, but is essentially de novo, and thus far more likely to be noticeable. Practical observation tells here as well. Commuter railroad lines run through very different kinds of neighborhoods in the metropolitan area. Rarely if ever is the character of a given neighborhood affected by its proximity to a rail line.

The project's property value impacts in the area of new stations are more complex to analyze, though in the end the MBTA believes they should not be adverse.

The station sites in Ashland, Millbury and Southborough will be located in areas of mixed commercial and residential use, though the proposed Southborough and Ashland sites are zoned for business and the Millbury sites are distant from nearby houses. For these sites, there is the general convenience and improved access to Boston that they serve, by extending farther out from the downtown core the distance of a reasonable commute; this should improve property values generally. For those who work in Boston, the project will help, at the margin, to preserve or increase the attractiveness, which has grown rapidly over the last two decades, of residing in any of the service area communities, and, conversely, allow service area residential real estate to continue to appeal to those who need or wish to work in Boston. These positive effects must be weighed against the possible adverse impacts on immediate abutters from traffic impacts during the peak hours, from noise and from station lighting at night; these might reduce the value of some properties. Nonetheless, such impacts will be minimized with effective design, including proper landscaping, lighting, and lighting fixtures, as well as the sensitive siting of stations. Moreover, lighting impacts will only be an issue in the evening or in the winter, during the morning commute, as timers will have extinguished them otherwise. In the end, the MBTA believes the balance of property value impacts from these stations near residences is likely to be positive, since the likely radius of adverse property value impacts is likely to be small (as is the magnitude of adverse effects within this small radius), whereas the likely radius of favorable property value impacts is likely to be much larger (even if these effects too are small), particularly within an easy walk or drive of a station. Experience in the near-in Boston suburbs is instructive: proximity to commuter rail or T service is a benefit. The MBTA has no reason to believe such

proximity will not, as road congestion increases over time, be as much of a benefit for more distant Boston suburbs. Moreover, in areas where commuter rail stations have been in existence for decades, they usually take on much the character of the neighborhood they are located in, whether it is modest or affluent. There is nothing about the project's stations which should lead to the conclusion that this longstanding pattern will not be repeated.

The proposed station sites in Grafton and Westborough will be in commercial or industrial areas, so station impacts on residences are less of an issue. In these communities, the stations could have small but positive effects on commercial development, since research tends to suggest that there is a correlation, all other things being equal, between proximity to a transit stop and low office vacancy rates. At the same time, these stations complement existing commercial development incentives offered through zoning by Westborough and Grafton, and the project offers considerable opportunity for reverse commuting from the Boston metropolitan area. (See Section 2.3 on reverse commute possibilities). Westborough is developing because of zoning changes which seek to tap the development market by encouraging commercial and industrial projects to locate in the vicinity of I-495, where the proposed Westborough site will be located, as well as along Route 9, not far from the proposed Westborough station site. Likewise, Grafton hopes the Tufts Veterinary School of Medicine will attract biotech firms to an area recently zoned to accommodate them, near the Campus Development Overlay District containing Tufts. The proposed Grafton station is located within this district.

Additionally, the restored commuter service will reinforce the attractiveness of development for both downtown Worcester and downtown Boston. The impact on Worcester may be greater due to the city's plan to use the Union Station area as one of several foci of downtown renewal. Nonetheless the project also will make access to downtown Boston easier, for the foreseeable future, for a larger part of the regional labor force.

6.3 Local Revenues

Wherever the proposed commuter station sites are now in private ownership, the relevant host community will lose the applicable local property tax revenues when the site is taken or purchased by the MBTA, since the MBTA, as a state entity, is exempt from local property taxation. In no case would substantial property tax revenues be lost from the MBTA's assuming ownership of a prospective station site,

based on the MBTA's review of the equalized valuations for the prospective station site communities.

There is, to counter this possible loss, the potential gain of property tax revenues by a community hosting a commuter rail station from either induced development, commercial or residential, near a station, or from the rise in property values, commercial or residential, because of their proximity to a station. Such increases are by no means unlikely in the service area, even beyond the likely secular rate of property value increases, if the new commuter rail service can offer acceptable commuting time between the service area and Boston. Like possible property tax revenue losses, these gains are likely to be modest. Unlike the possible losses, the possible gains will likely accumulate from the large number of properties that are positively affected in their valuation, or which are built because the new service improves the relative attractiveness of the service area communities for new residential or commercial projects.

6.4 Assessments

The project's CAC, in a letter to the Secretary dated May 6, 1993, expressed interest in the MBTA assessments to which their respective communities might be subject because of the project. This interest is understandable. On one hand, MBTA assessments are deducted by the state treasurer from the annual local aid a community is otherwise entitled to receive from the state, and thus affect a community's net state aid. On the other, none of the original 78 communities of the MBTA district can withdraw, without legislative approval, from that district. The CAC urged upon the Secretary the appropriateness of scoping the assessments question for inclusion in the DEIR the MBTA was required to submit on the project. The Secretary, in responding to the CAC's urging, argued that "[f]inancial and socio-economic impacts are generally outside of [MEPA] ... jurisdiction", and indicated to the CAC that "I do not anticipate that I will comment directly on any conclusions reached in the MBTA's response to the CAC's financial concerns." Nonetheless, the financial impacts question was scoped for MBTA response in the DEIR.

The MBTA had already responded about these impacts, in discussions with the CAC and with various CAC members, before the CAC's letter to the Secretary. That response remains very much in order, not least because it rests on the current law of the Commonwealth.

The facts are plain. Under current law, only communities within the MBTA district are subject to assessments. Under current law, of the communities directly affected by the project—Worcester, the project's planned westerly terminus; Millbury, Grafton, Westborough, Southborough and Ashland, the five potential new station location communities; and Framingham, the departure point for the project—only Ashland and Framingham are currently within the MBTA district.

Under current law, only Ashland and Framingham among the project communities might thus see a revision of their assessments to reflect changed circumstances of service. An estimate of such possible changes for the 78 MBTA district communities, for the Calendar Year 1992 assessment, was provided by the MBTA to the MBTA Advisory Board. The MBTA estimated the CY 1992 assessment for Ashland would increase 0.40%, and for Framingham 0.31%. The MBTA's estimate assumed no change in the prevailing rules for calculating assessments.

Under current law, none of the other potential new station location communities or Worcester will be subject to any MBTA assessment because of the project. Under current law, most of the project's net cost will, just like the costs of all other MBTA services being offered outside the MBTA district, be covered by the state's assistance to the MBTA, which is funded by the individual taxpayers of the Commonwealth. As of 1992, there are 52 communities outside of the MBTA district which are served by commuter rail service, inter-district bus service, or both. Under current law, for most of the project communities, the answer to the question about possible assessments is thus quite simple: there will be none.

The MBTA believes that this response not only covers current circumstances, but likely future circumstances.

The MBTA's response concerning future circumstances is made against the backdrop of the last thirty years. The assessment formula, not the MBTA's creation but legislatively mandated and changeable only by the legislature, was part of the MBTA's 1964 authorizing legislation, G.L. c. 161A, and has not been changed in the fundamentals of its calculation since first enacted. And, over the thirty years since the legislature created the MBTA, there have been remarkably few concrete proposals, from any source, to change from the existing to alternative assessment formulas—not a surprising result given the obvious complexities. Several new formulas for various aspects of MBTA service were proposed by the McIntyre Commission of the late 1960's; these were embraced in principle by a commission created by Governor Sargent in the early 1970's, but Sargent dropped them in making his subsequent proposals about MBTA reform to the legislature. A 1980 report advocated for new formulas reflecting the marginal cost approach of the McIntyre Commission, but did

not actually propose any new formulas as did the McIntyre Commission. The MBTA Advisory Board made several assessment formula proposals in 1989, but they were only focused on changes within the existing MBTA district, proposing that the communities would absorb little if any additional portion of the net cost of service and thus essentially shifted costs among MBTA district communities, and have, in any case, gone nowhere since being proposed. Since the Advisory Board's review of MBTA finances and financing, there have been no proposals which actually proposed new terms for MBTA net cost of service assessment formulas. Instead, the concerns of the legislature, and of external observers, have lain elsewhere.

The chief legislative preoccupation has been relieving the MBTA district communities of assessment burdens. This has taken two forms. One form of relieving MBTA assessment burdens has affected the particular shares of some vs. other MBTA communities, though not by any direct action on the assessment formula. For example, no express service stations added since July 1, 1973 may figure in calculating a community's assessment. Beginning in FY1983 and since, 23 MBTA district communities receive aid offsetting an average of about 70% of their individual MBTA assessments, to compensate them for being in the MBTA district but having no service within their bounds. And Boston must assume 30% of the 75% of express services' costs allocated among the MBTA district communities. The other form of relieving MBTA assessment burdens has affected the assessment costs of all the MBTA district communities, but again not by any direct action on the assessment formula. Assessments in 1964 were covered much as they had been under the predecessor Metropolitan Transit Authority—chiefly by the member communities. Rapidly escalating deficits in the early 1970's brought pressures for change. A brief era of parity began in 1973, when, for the first time, the state paid a portion—roughly half—of the MBTA operating deficit assessable on the MBTA district, and committed to share half in the future. This era ended in 1980 when the dynamics underlying Proposition 2½ reached the MBTA assessments, resulting in a cap on their annual growth of, first, four per cent, and, later, 2½ per cent.

The Proposition 2½ cap on annual MBTA assessment increases has elicited essentially undeviating bipartisan support, and continues unaltered to this day. The 1980 governor's task force committed to the 4% assessments growth cap of the day. In the boom days of the 1980's, an increasing state role was an easily absorbed cost, indeed general state aid increases more than offset increases in the MBTA assessments, and this increased aid was seen as a reasonable tradeoff as well for the deliberate policy of keeping fares low so as to encourage ridership on newly built or refurbished facilities. The Senate Ways and Means Committee's 1990 proposal that the state and MBTA district communities evenly split future increases in MBTA net

cost of service was never adopted even by the Senate. In 1992, the House quashed an attempt to end the 2½ per cent annual cap on assessment increases. And in 1994, the Governor's FY1995 budget message committed, among other objectives, to preventing wholesale 2½ changes, instead relying, to control the MBTA net cost of service, on a statutory operating budget cap and on the statutory requirement that the MBTA recover a minimum of one-third of its operating costs (net of debt service and the cost of private carrier subsidies). This latter resulted in modest increases in fares in 1991, though fares still lag well behind the growth in operating costs—in constant 1970 dollars, a recent study estimates, the average real fare has fallen 27 per cent. Nonetheless, the 1993 MBTA fare policy statement does not suggest that fares will rise significantly faster than inflation, which means fares will not likely play a significantly different part than they do now in balancing the MBTA's income and receipts, and only slightly more than they did during the 1980's.

In short, pressures for state aid around net cost of service have increased further, and that aid now has risen to a level unprecedented among comparable large urban public transit systems. Recent signs are that the relatively small remaining amount that the MBTA district communities pay for MBTA service may well be the next target. Recently the legislature's joint transportation committee undertook to explore the state's assuming all costs currently assessed on the MBTA district communities.

The chief preoccupations of outside observers have not been with assessments either, but with a logical complement of the legislature's apparent drive to have state aid to minimize MBTA assessment costs as local matters—long-term funding mechanisms which end or reduce reliance on current state funding mechanisms. Most of these proposed funding mechanisms have been taxes of one or another form: local-option taxes by means of which localities could meet their assessment burdens, or statewide taxes which do not particularly seek to shift much, if any, of the current cost burden back to the district communities. But these proposals all entail new revenues, local or state, and thus are difficult to achieve at best in a time where sensitivity to new taxes is high. Moreover, they would likely require amending Proposition 2½, the state tax cap, or both. Other proposed funding mechanisms are directed at changing the "terms of trade" for driving vs. using public transport to get to and from downtown Boston. Yet these mechanisms also involve new imposts, in the form of highway commuter tolls, and thus are not much more palatable than new taxes.

Thus, the foreseeable future is much like the present. There is much unhappiness about assessment levels, and there may be further state aid to alleviate assessments for the MBTA district communities, but no looming proposals for new MBTA assessment formulas. There is much ferment over alternative funding without assessment implications, but no consensus about how which funding mechanism would be best, or how it squares with prevailing fundamentals around taxes and tolls. No important change appears imminent around current MBTA assessment formulas. This means that, save for the small assessment changes already described for Ashland and Framingham, there is no predictable future affect from assessments on the other project communities.

SECTION 7.0 ENVIRONMENTAL IMPACTS—RAILROAD RIGHT-OF-WAY

This section addresses the potential effects of commuter rail service along the railroad corridor between Framingham and Worcester, a distance of approximately 23 miles. Environmental resources along the corridor are depicted on the following pages on Figure 7.0-1, panels 1 through 8. Between mile posts 33 and 40, a second track will be restored, requiring a substantial amount of track bed reconstruction to improve rail sub-ballast and wayside drainage then, new ballast, ties and continuous welded rail will be installed. The focus of environmental impacts related to drainage and wetlands is this 7 mile section of the rail corridor.

The additional railroad traffic in the corridor from implementation of basic commuter rail service (20 trains per day) will result in noise impact to 6 residences in Grafton; expanded service will result in noise impact to a total of 92 residences along the entire corridor. Vibration impact will occur at 41 residences along the corridor for either basic or expanded service.

The most beneficial method of mitigation may be installation of barriers to reduce train noise and installation of ballast mats to reduce vibration impacts. During final design, additional studies will be performed to determine the effectiveness, feasibility, and acceptance by the community, of noise and vibration impact mitigation measures. MBTA policy allows for the expenditure of up to 2% of construction costs for noise and vibration impact mitigation.

Restoration of double track along a 7 mile segment of the rail corridor between Westborough and Worcester will include wayside drainage improvements. No new stream crossings will be required, although some minor alterations to existing crossings will occur. An estimated 2,700 square feet of bordering vegetated wetlands (BVW) will be displaced, of which total, some 1,500 square feet will result from reconstruction of Pine Street in Grafton by the Massachusetts Highway Department, a project that will proceed with or without commuter rail extension.

Rail bed improvements are being designed to minimize potential adverse effects on resource areas. Any work affecting resource areas or within the buffer zone will be

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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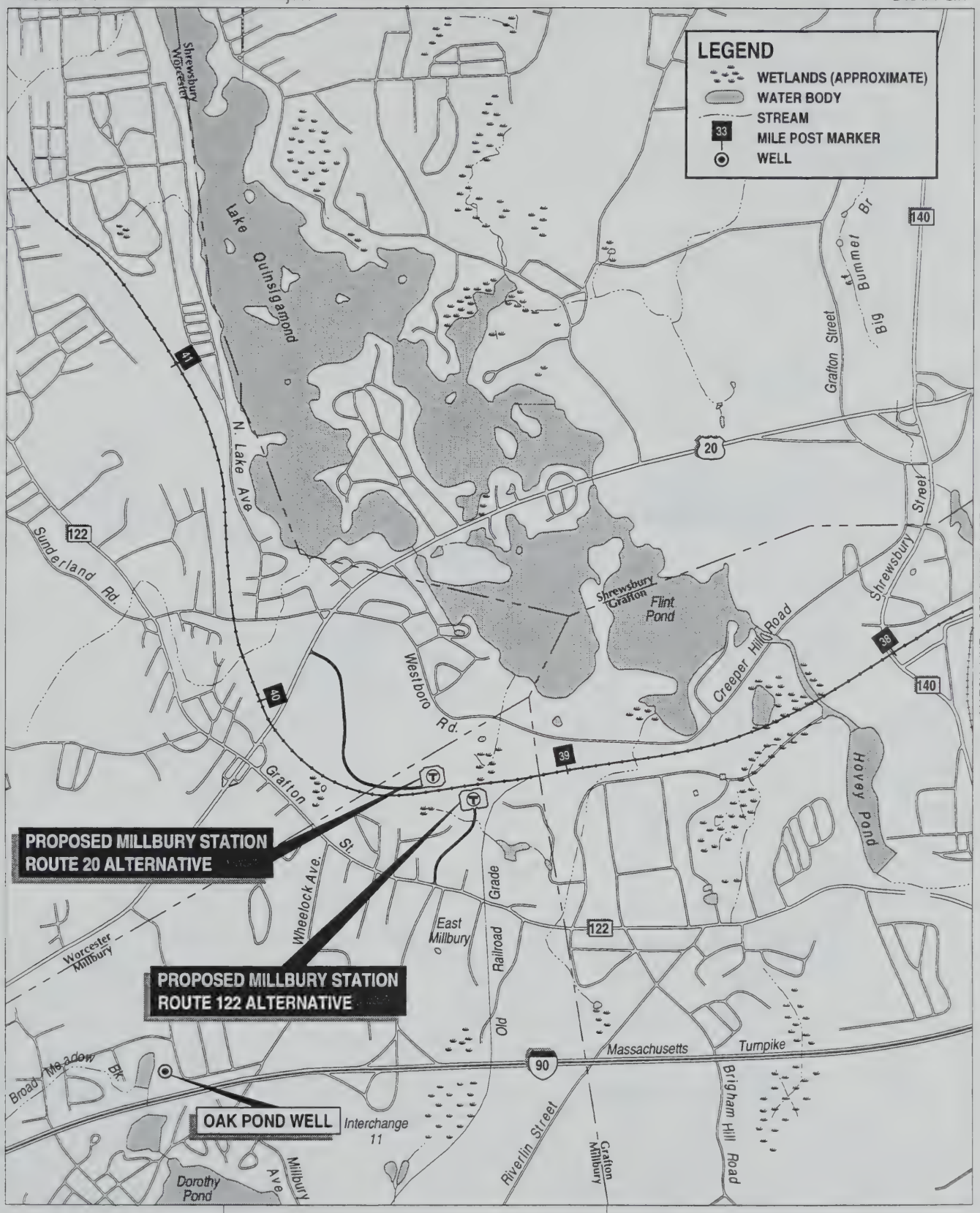
ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 1 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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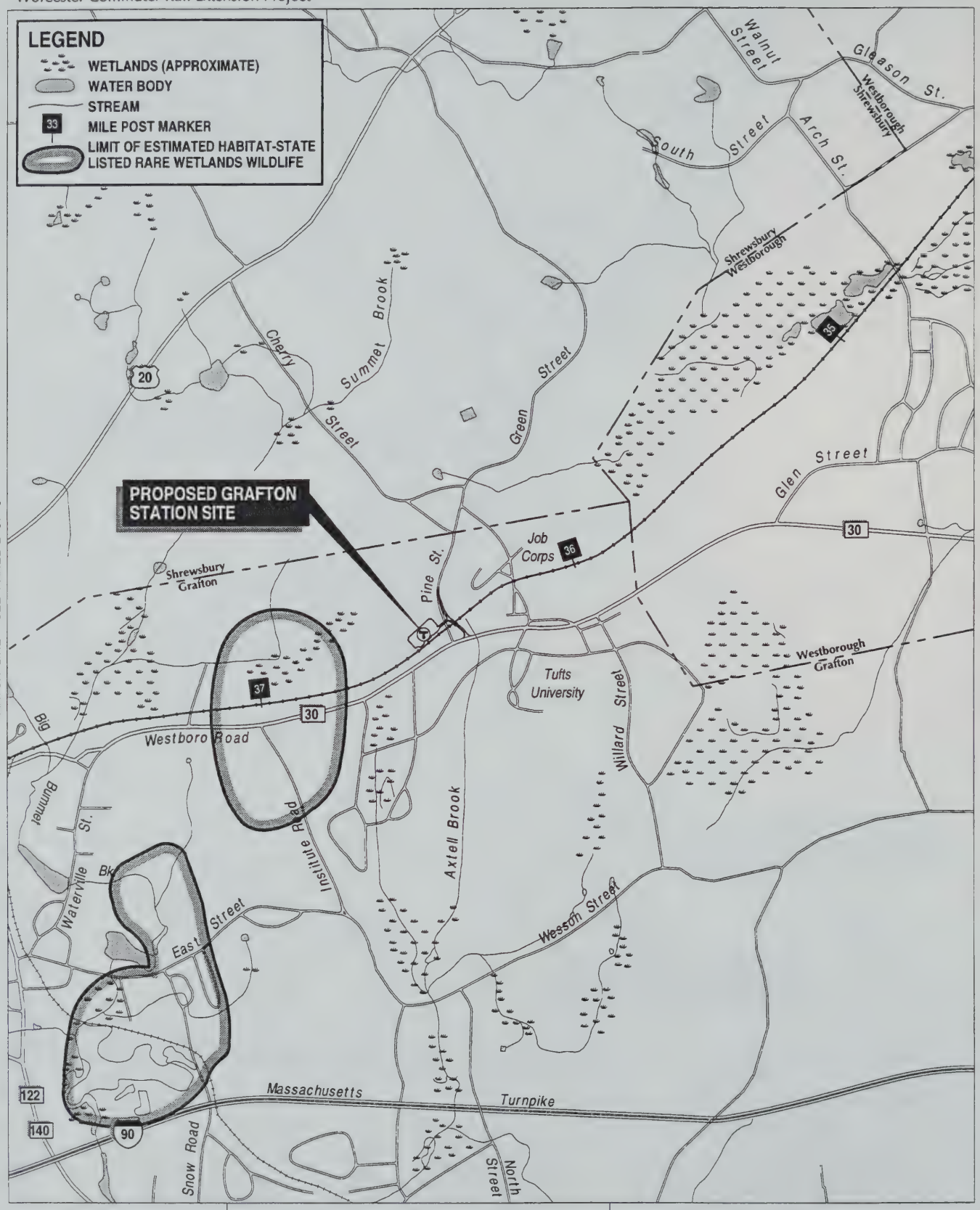
ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 2 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'
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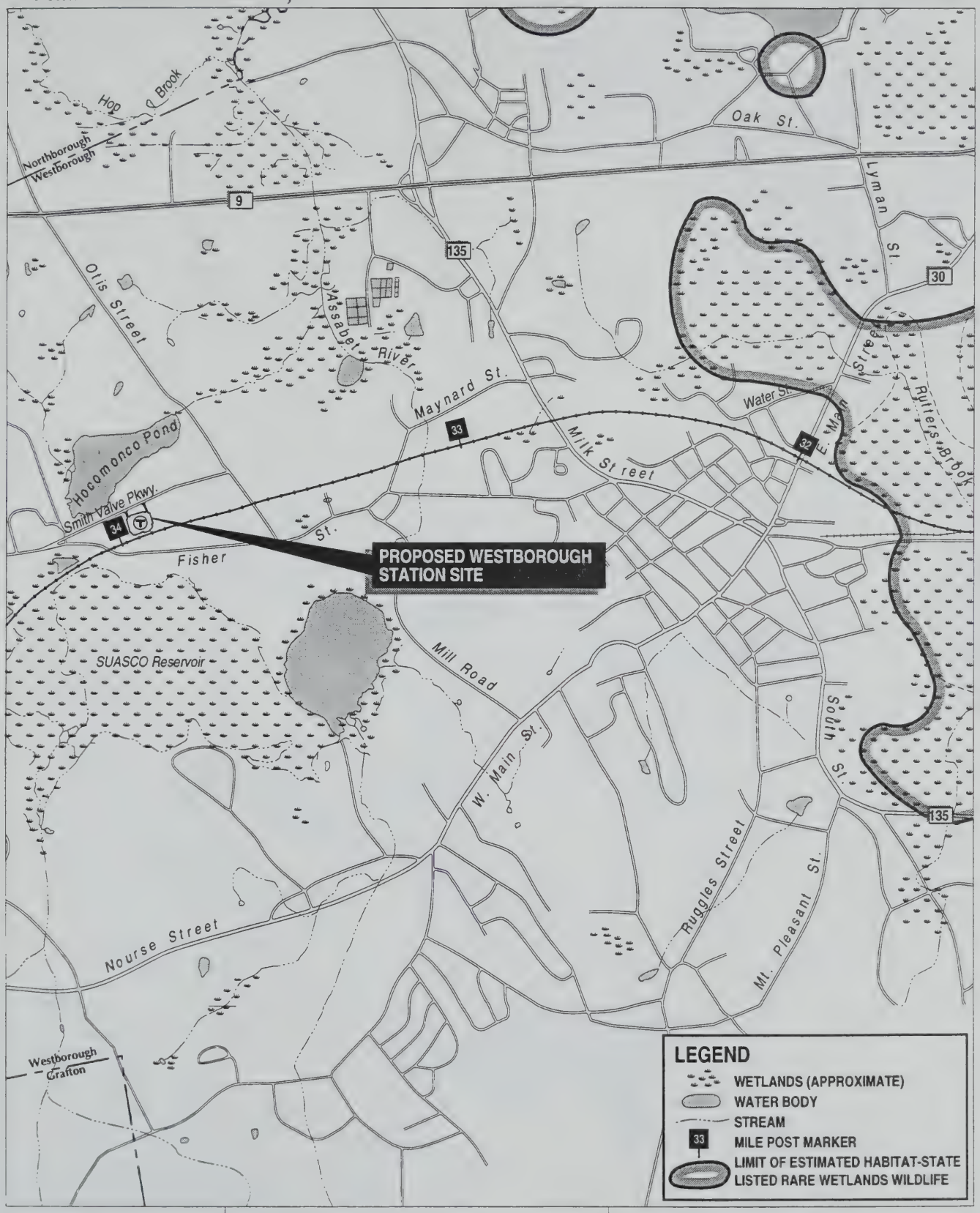
ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 3 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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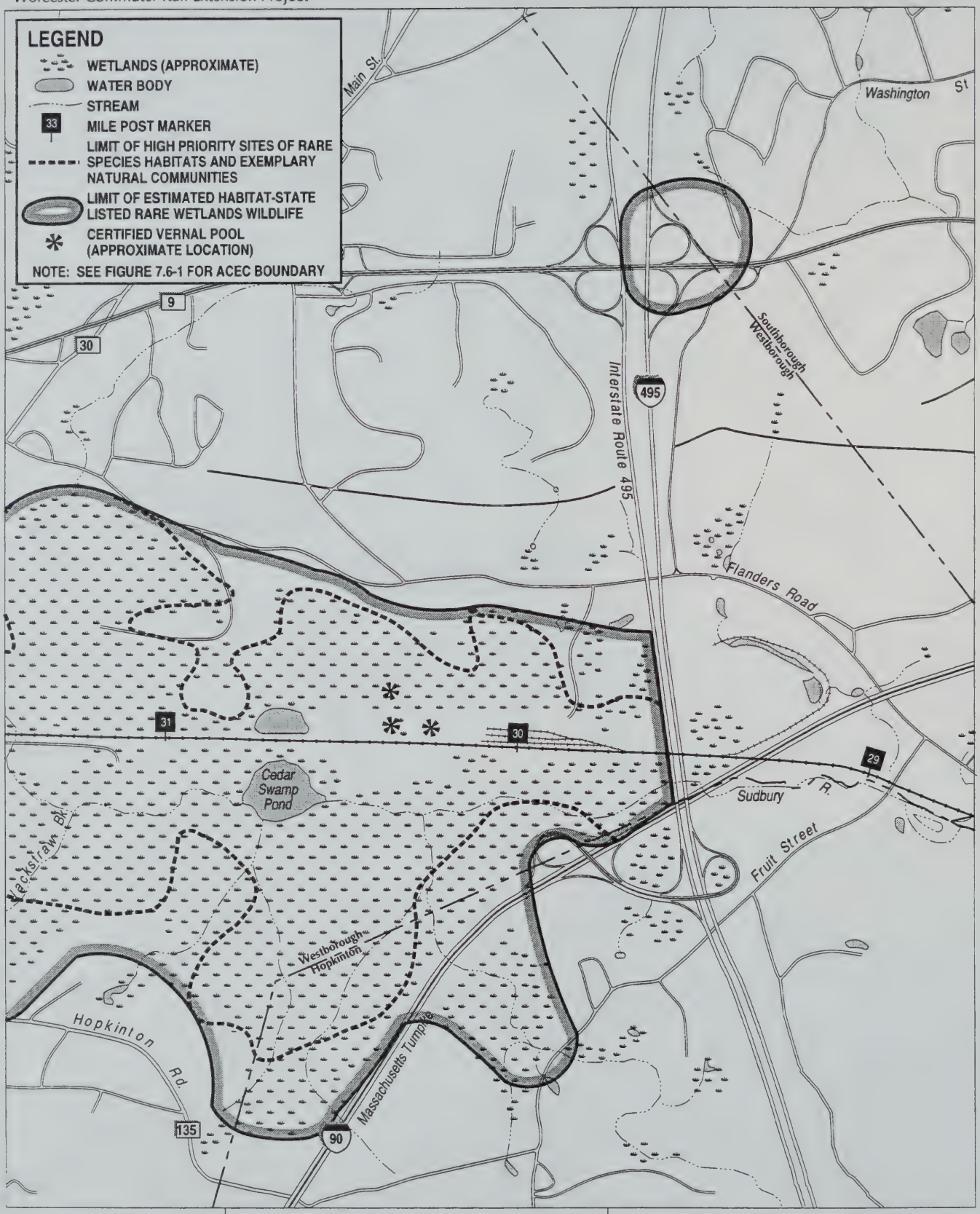
ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 4 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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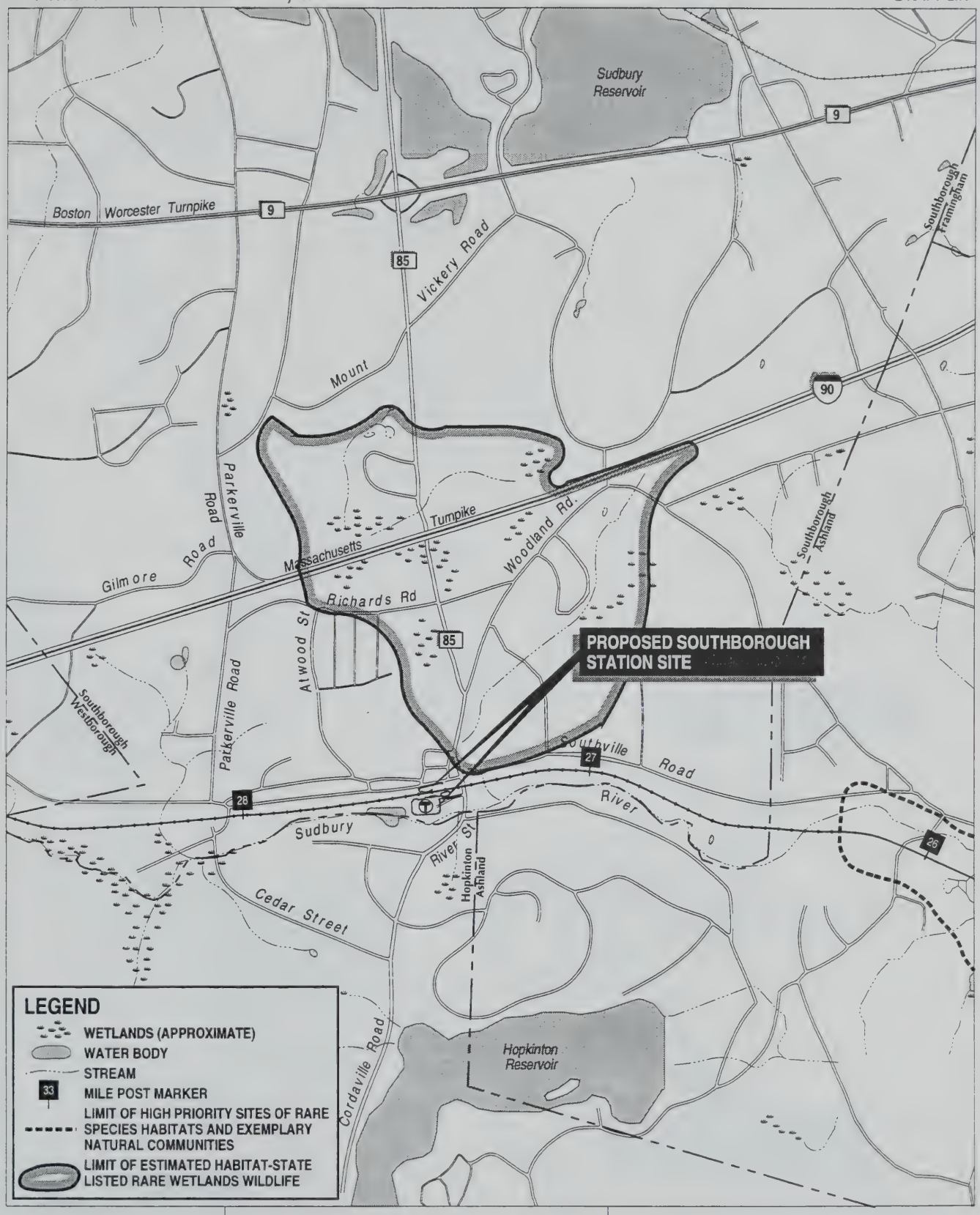
ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 5 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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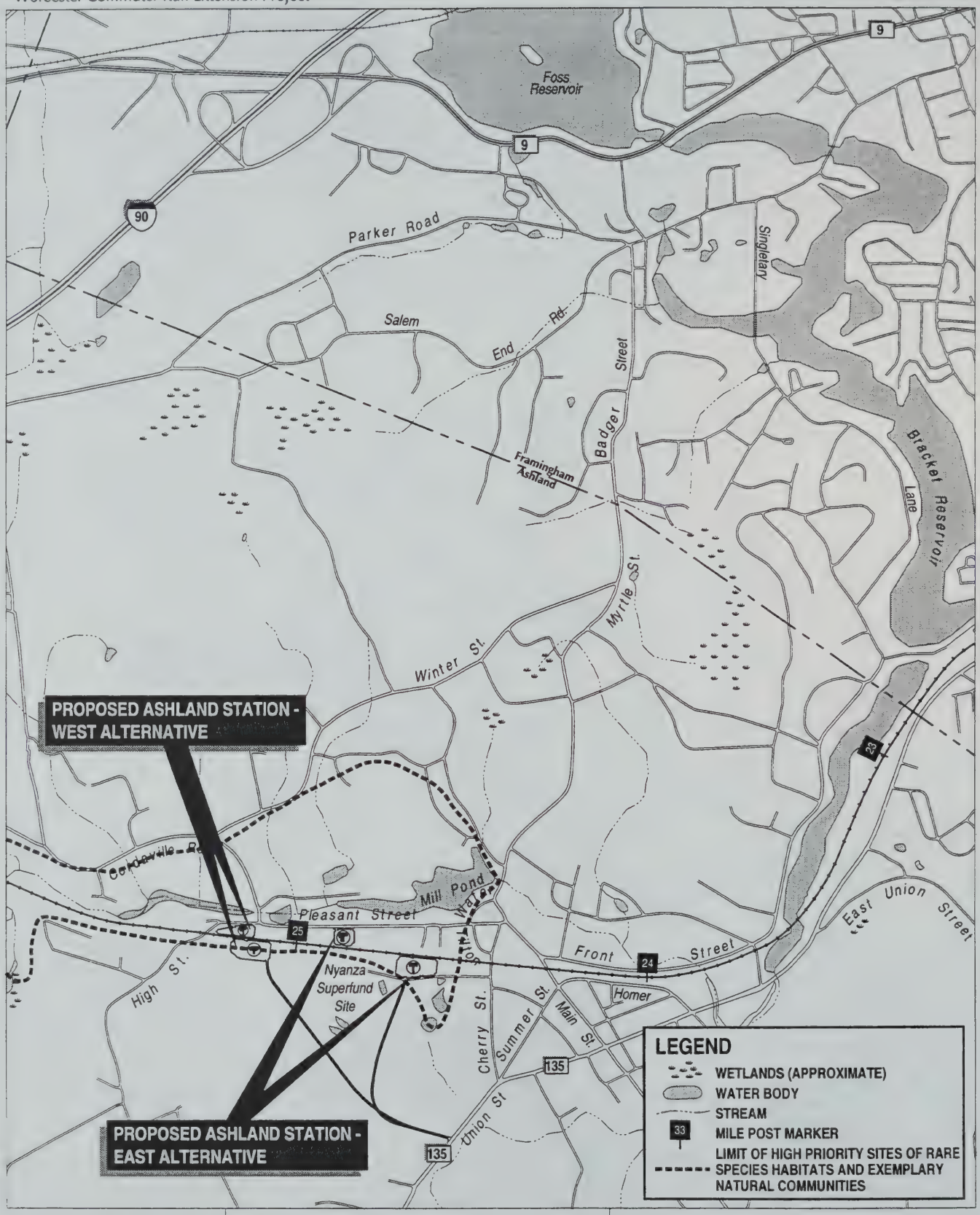
ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 6 OF 8



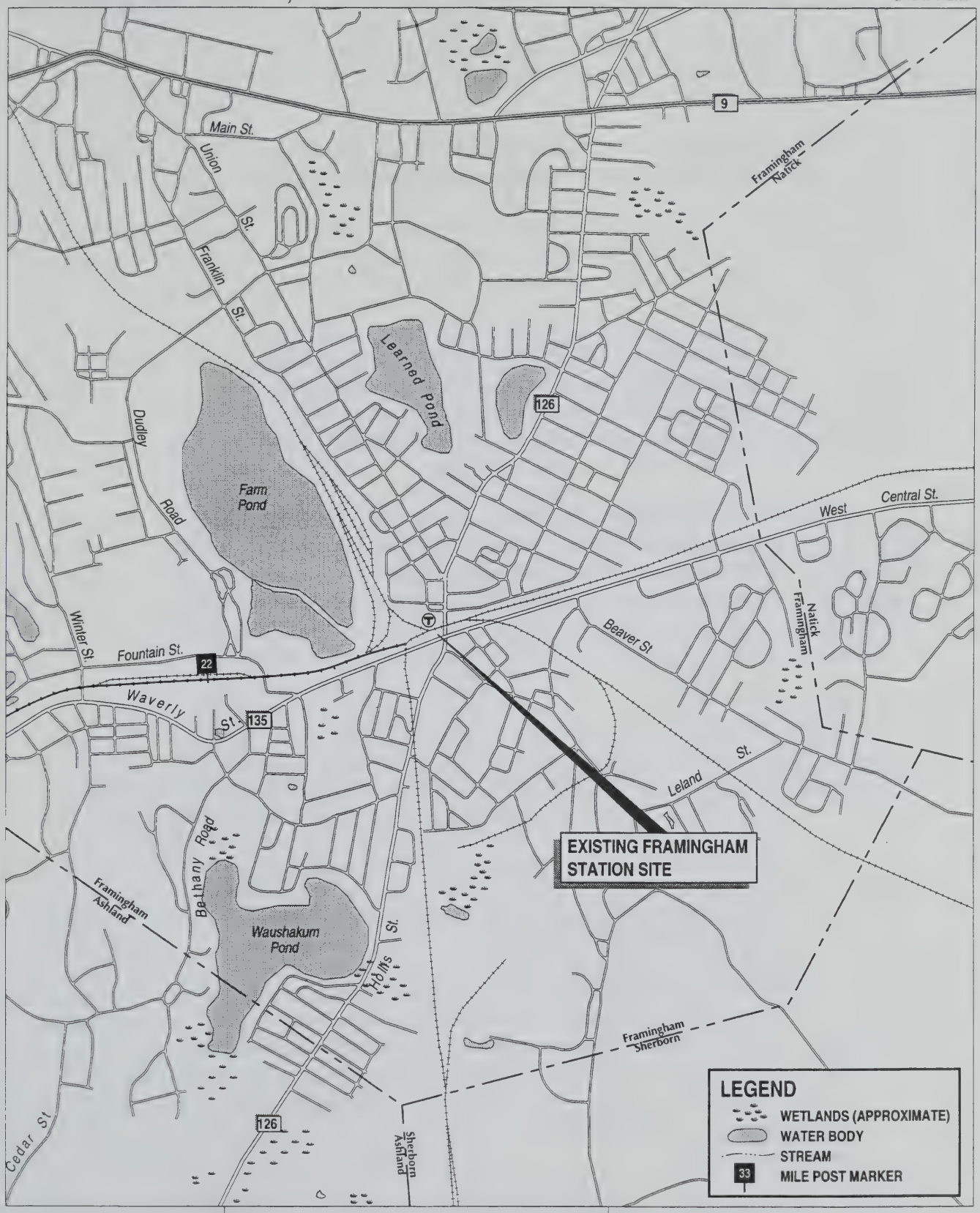
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

0 2000

ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 7 OF 8



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'
0 2000

ENVIRONMENTAL RESOURCES PROJECT CORRIDOR

FIGURE 7.0-1 PANEL 8 OF 8

reviewed by local conservation commissions and construction will be performed in compliance with any order-of-conditions that may apply.

The Natural Heritage and Endangered Species Program has been contacted regarding rare species and ecologically significant natural communities. Construction activity related to the proposed project will not occur within areas known to have records of rare species.

In accordance with the EOEA certificate for this project, an architectural survey was conducted along the project corridor. Architectural survey forms for those buildings and structures which may be affected by the project (primarily visual affects) will be completed and reviewed by the Massachusetts Historical Commission (MHC) prior to the Final EIR being submitted to MEPA.

An archaeological and cultural resource reconnaissance survey of the rail corridor was performed in coordination with the MHC and the state archaeologist. Several archaeological resources were identified. As a component of the FEIR preparation, a study based on the findings of the reconnaissance survey will be performed.

7.1 Local Traffic

The impact on local traffic resulting from operations on the railroad right-of-way is essentially restricted to the three existing grade crossings between Framingham and Worcester. The increased number of train operations on the corridor will result in a corresponding increase in the daily activation of crossing warning devices.

The Parmenter Crossing in Grafton, which is protected by warning lights and bells, is lightly used by vehicular traffic, as it services a dead-end road.

In Ashland, grade crossings at Cherry Street and Main Street are protected by gates, warning lights and bells. Located near the downtown section of Ashland, these crossings are heavily used, particularly the Main Street crossing. Town officials have reported existing operational problems with the protection devices in that the signals occasionally activate when no trains are approaching. The MBTA currently is exploring, with Conrail, possible remedial measures, such as replacement of the control box.

The proposed Ashland commuter rail station will provide substantial parking on the south side of the tracks for station patrons who reside south of the railroad. Many of these drivers currently use the grade crossings to travel local roads north, through

downtown Ashland, to access Route 9 or the Mass Pike in Framingham. Provision of commuter rail parking will, to some extent, reduce the number of vehicles using the grade crossings.

7.2 Air Quality

Internal combustion engines are a major source of air pollutants such as carbon monoxide (CO), hydrocarbons (HC), and oxides of nitrogen (NO_x). Diesel engines such as those in railroad locomotives, are also sources of oxides of sulfur (SO_x) and particulates.

Carbon monoxide and hydrocarbons result from incomplete combustion of fuels, while oxides of nitrogen result from burning fuel at high temperatures. The oxides of nitrogen and gaseous hydrocarbons play a role in the formation of photochemical smog; however, the impact of photochemical oxidants generally occurs a great distance away from the source of emissions. The effects of hydrocarbons and oxides of nitrogen are evaluated on a regional basis, rather than evaluating effects adjacent to the rail corridor.

The most obvious effect of locomotive exhaust is apt to be smoke, which consists primarily of particulates. The exhaust also contains oxides of sulfur, oxides of nitrogen, and minor amounts of unburned fuel. The unburned fuel is responsible for the odor associated with diesel engines.

Particulates have a short-term effect on local air quality adjacent to the tracks, in that these particles are generally thought to settle out of the air within a short time. There are, however, no accepted models available to address particulates emissions.

The line haul air quality effects of locomotive operations have been estimated and are discussed above in Section 5.5.

The potential effects of diesel exhaust at the layover facility are described in Section 9.0.

7.3 Noise and Vibration

Train Operations

Although the railroad corridor between Framingham and Worcester has been carrying both freight and inter-city rail traffic for many years, the proposed addition of commuter train operations may affect the noise and vibration environment along the right-of-way. These changes relate primarily to an increase in train frequency, consists, and speeds (consist refers to the make-up of the train, i.e., number of locomotives, coaches, freight cars, etc.). Both the methodology used to quantify these changes and the criteria used to assess their effects are described in detail in Appendix - Volume II, Section 3, Noise and Vibration, bound separately from this document. These results are summarized below.

Noise Impacts from Train Operations

The basic unit for assessing community noise is the A-weighted Sound Level, expressed in decibels (dBA). The A-weighted sound level is a single-number measure of sound pressure with frequency content weighted to correspond to the human ear's sensitivity to noise. For an intermittent noise event such as a train pass-by, various metrics or descriptors exist which apply to noise measurement methods, computations, and impact assessment. Most useful are those based on the noise "dose" or total sound energy during one or a number of events, which correlate well to people's reaction to noise. Some of the descriptors that apply to rail transportation noise are defined in Appendix - Volume II, Section 3.

The significance of noise impacts from train operations on the Worcester commuter rail extension corridor was assessed based on the projected total noise increase relative to existing conditions at noise-sensitive locations abutting the right-of-way. Noise-sensitive land uses considered in this study include 1) residences and other buildings where people normally sleep; 2) institutional uses such as schools and churches, and 3) buildings and park lands where quiet is an important element in their intended purpose, such as outdoor concert pavilions. This total noise increase is measured in terms of the change in the day-night sound level, or L_{dn}. The L_{dn} measure represents the total dose of noise energy at a given outdoor location over a 24-hour period in terms of the A-weighted sound level (dBA), with a 10 decibel penalty on noise occurring during the nighttime hours (10 P.M. to 7 A.M.).

To indicate representative values of L_{dn} for everyday noise, Figure 7.3-1 provides examples of typical noise environments and criteria. Except for extreme situations, L_{dn} is generally found to range between 55 dBA and 75 dBA in populated areas. As shown in the figure, this spans the range between an "ideal" and an "unacceptable" residential environment according to federal agency criteria.

Although the project involves primarily the addition of commuter rail trains, track improvements and schedule requirements are expected to result in higher speed allowances for all train traffic, both passenger and freight. Hence, the cumulative effects of overall speed increases as well as increases in the number of train operations per day were considered and accounted for in the impact analysis.

A standard theoretical model was used to predict existing and future noise levels, using reference noise source emission levels for the various equipment types obtained from measurements. Noise measurement data of MBTA commuter rail trains along the Framingham Line were used as the reference for future levels generated by commuter service along the project corridor. Similarly, measurements of existing Amtrak and Conrail trains were used for estimating the non-project components of the overall noise environment.

While the Appendix describes the noise model and its assumptions in detail, Figure 7.3-2 illustrates how the various noise sources behave as a function of train speed, at a fixed distance to each source. Plotted vertically is the source's maximum noise level during a train pass-by, while train speed is plotted horizontally. It is shown that the noise generated by the interaction of the rail car wheels and the rails has a strong speed-dependency, and the noise from these sources increases rapidly with train speed. In contrast, noise from diesel locomotives exhibits a very weak dependence on speed, and shows little variation. The combined result is that at very high speeds, wheel/rail sources dominate the wayside noise while at low speeds noise from the locomotive exhaust is predominant. Locomotive horn noise exhibits no speed dependence due to the on/off nature of the noise source.

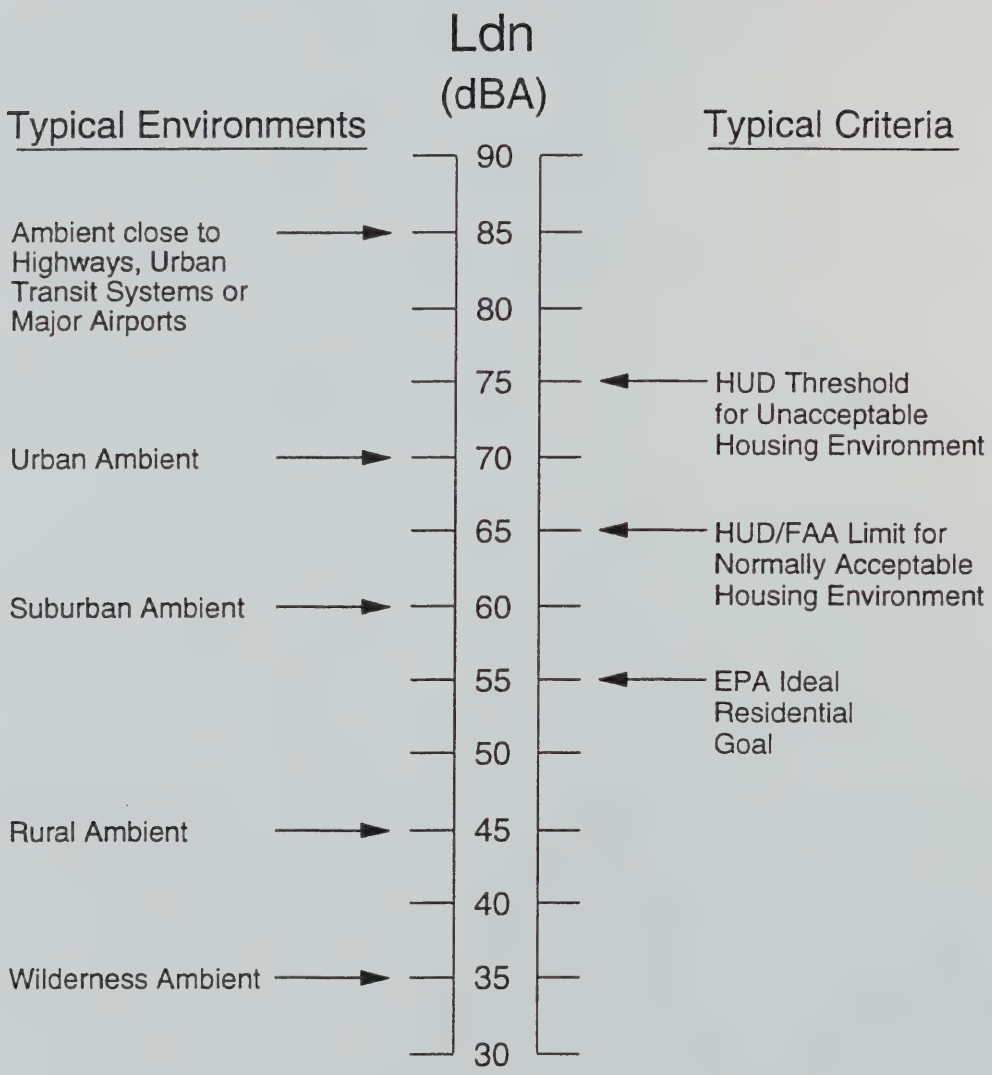


Figure 7.3-1 Typical L_{dn} Values and Criteria

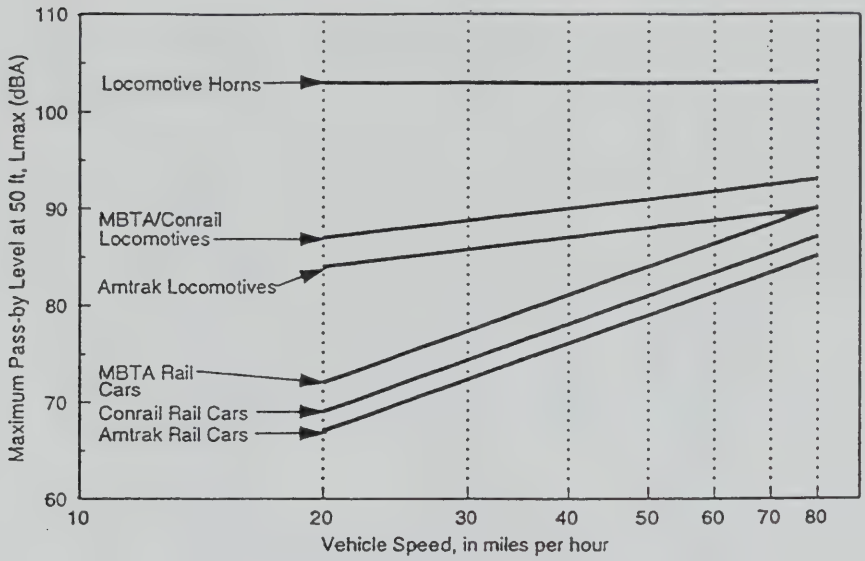


Figure 7.3-2 Dependence of Maximum Sound Levels on Vehicle Speed (at 50 ft)

Table 7.3-1 provides an overview of train noise impact along the project corridor, based on the results at representative measurement sites. Details of the measurement program also are provided in the Appendix, including site locations and results. The table lists the L_{dn} projected by the noise estimation model at each of the eight measurement locations for the existing, basic, and expanded commuter rail service conditions. It also indicates the predicted noise increase for both future MBTA service alternatives, along with site-specific impact criteria and assessment.

These criteria are given in terms of the "limit for increase" in the total L_{dn} from existing to future, and is defined according to the proposed FTA criteria used for this project. A detailed discussion of the criteria is given in the Appendix. To summarize, the increase in cumulative noise provides the basis for the impact criteria, since any new noise source in a community will cause a noise increase, even if the new source level is less than the existing level. The criteria impose a limit for this increase in L_{dn} according to the existing ambient L_{dn} at each site. For example, a noise increase of 10 dBA is allowed if the existing L_{dn} is 42 dBA or less, but only a 1 dBA increase when the existing L_{dn} is 70 dBA, an already unacceptably high community noise level.

Table 7.3-1 Train Noise Impact Assessment at Measurement Sites

Site	Milepost	Town	Dist. from Track CL (ft)	Total Existing L_{dn} (dBA)		Limit for Increase (dBA)	Basic MBTA Service			Expanded MBTA Service		
				Measured	Predicted		Total L_{dn}	Increase (dBA)	Impact?	Total L_{dn}	Increase (dBA)	Impact?
1	44.3	Worcester	425	76	75	2	75	0	No	75	0	No
2	40.3	Worcester	50	65	68	3	70	2	No	71	3	Yes
3	39.3	Millbury	200	63	62	5	65	3	No	66	4	No
4*	37.1	Grafton	100	70	72	3	73	1	No	74	2	No
5**	33.7	Westborough	50	--	68	3	70	2	No	72	3	Yes
6	32.2	Westborough	100	62	65	4	68	3	No	69	4	Yes
7	28.1	Southborough	70	68	67	3	69	2	No	70	3	Yes
8*	24.6	Ashland	90	71	72	3	73	1	No	74	2	No

* *Indicates measurement site located near grade crossing.*
** *Indicates short-term measurement site; L_{dn} not measured.*

Table 7.3-2 provides a corridor-wide inventory of projected train noise impact. This table indicates the estimated number of noise-sensitive receptors, in terms of residential dwelling units, located within the noise impact zone for the basic and expanded service scenarios. The noise impact zone was determined by comparing noise projections with the project criteria along individual segments of the corridor, and by calculating the distance from the tracks within which impact would occur. (These train noise impact distances are given in the Appendix). All of the receptors were residential land uses since there were no noise-sensitive institutional land uses identified within the applicable distance from the right-of-way. The numbers of residential buildings located within the impact zone were counted with the aid of land-use maps and aerial photographs of the project corridor.

Due to the smaller number of trains per day (20) scheduled under basic service conditions, a total of only six residential noise impacts were identified, all of which are located in Grafton. Because the criteria are based on the estimated project L_{dn}, which is a 24-hour measure of the cumulative sound exposure, the level of impact is a function of not only the noise emission level generated by a single train pass-by but also of the number of pass-bys during a given day. For this reason, the projected noise impact under the expanded service scenario is greater than the basic service scenario.

Day-Night Sound Level, or L_{dn}, is the authorized descriptor for environmental noise to be used in environmental impact statements according to the U.S. Environmental Protection Agency (EPA) and other Federal agencies. Research by EPA has shown that L_{dn} correlates well with the results of attitudinal surveys of residential noise impact irrespective of where in the 24-hour period the majority of noise occurs.

The primary cause of noise impact along the corridor under expanded service conditions is the additional 12 train operations per day. The increased maximum speed projected for both passenger and freight trains is also a factor in some areas. For localized areas, the sounding of train horns near grade crossings has a significant contribution to the total noise exposure. For example, the noise impact assessment for the town of Ashland shows that two crossings within one-half mile of each other in a largely residential neighborhood contribute to high noise levels, both existing and future. In Ashland, four of the nine residential units listed as impacted in Table 7.3-2 are in a multi-family elderly housing building located adjacent to the Cherry Street grade crossing.

Another area of concentrated noise impact is in the segment between Route 30 and Route 135 in Westborough, where several abutting residences are within 30 ft of the rail corridor. Similarly, the large residential area east of Route 140 in Grafton will be impacted by train noise. Through both of these sections, train speeds approach the

upper limits and the planned increase in speed limit has a significant effect here. The other noise impacts identified along the right-of-way consist mainly of scattered residential land uses also situated very close to the tracks.

Table 7.3-2 Corridor-Wide Train Noise Impact Inventory

City/Town	Milepost		Corridor Length (miles)	Residential Units Impacted	
	From	To		Basic Service	Expanded Service
Framingham	21.3	22.8	1.5	0	3
Ashland	22.8	26.4	3.6	0	12
Southborough	26.4	28.5	2.1	0	5
Westborough	28.5	35.8	7.3	0	32
Grafton	35.8	39.0	3.2	6	26
Millbury	39.0	39.6	0.6	0	0
Worcester	39.6	44.3	4.7	0	14
TOTALS			**23.0**	**6**	**92**

Train Noise Mitigation

As indicated above, the train noise evaluation projects a total of 92 residential units to be within the zone of impact for the proposed expanded service commuter rail scenario. The analysis also indicates that the primary sources of this impact are expected to be the increased train speeds as well as the greater train frequency. To address potential impact mitigation, source, path, and receiver noise control measures have been considered as described below.

Source Noise Control

Train noise control at the source can involve equipment and track-related measures as well as operational modifications. Although with diesel-locomotive trains the highest noise levels are not necessarily caused by the wheel/rail interactions, one effective mitigation measure will be to ensure a good maintenance program. Such a program includes the installation of equipment to detect vehicle wheel flats on a continuing basis, along with periodic wheel truing and grinding.

In the case of the noise impacts identified as a result of horn noise near the Ashland and Grafton grade crossings, a potential mitigation measure would be the installation of stationary horn devices. While still in the experimental stages, this type of system would involve the installation of horns at fixed locations at the grade crossing, rather than on the trains themselves. The horns would be part of a standard signalized grade crossing, and activated from the train as it approaches the crossing. The warning

sounds would be aimed directly down the cross-street in the immediate vicinity of the crossing, where they are needed most, and not directed sideways into the community as occurs with conventional locomotive-mounted horns.

Path Noise Control

The installation of wayside noise barriers, designed to block the direct sound path between the trains and the noise-sensitive sites along the corridor, is the most common and is likely to be the most effective measure to mitigate train noise impact. Such barriers would need to be heavy enough, high enough and long enough to provide the necessary shielding. A noise barrier ideally would provide 10 to 15 dBA of noise reduction for the maximum level generated by a single train passage. Assuming that train noise is the dominant source of the noise for a protected location, this translates to about 5 to 10 dBA reduction in the L_{dn}.

A rough estimate of the extent of barrier needed to mitigate train noise impact has been made based on the results of the impact inventory. The estimate assumes that at least 200 feet of barrier length would be required to shield an individual, isolated residence. In more densely populated areas where aerial photos were used to identify impacted residences, the estimated barrier length was determined by the geographic limits of the affected housing cluster.

The summary of potential train noise mitigation provided in Table 7.3-3 indicates the estimated length of noise barrier needed to mitigate all train noise impact in each community along the project corridor for the expanded service train schedule. Mitigation cost estimates were made based on a 16-ft high noise barrier costing $20 per square foot. The minimum barrier height for diesel-hauled trains is significantly higher than that of electric or rapid transit trains because the barrier must be high enough to shield the predominant noise source, the locomotive exhaust, which is positioned 10 to 12 ft above top-of-rail. Based on the projected extent of barrier required, the total cost for noise impact mitigation is estimated to be $5,424,000 for expanded service and an estimated $384,000 for basic service.

The barrier locations, lengths, and heights estimated in the study are at this stage preliminary. Detailed barrier designs will be developed during the final design stage of the project, and the barriers will be constructed only if they are found to be effective, feasible, and acceptable to the communities. Some of the factors to be addressed are the structural, aesthetic, and acoustical feasibility of the barriers, as well as cost effectiveness with respect to acoustical benefits. For example, a barrier that protects only one or two homes is less likely to be constructed than one that protects a large number of homes.

The Massachusetts Highway Department applies a cost/benefit criterion to all proposed sound barriers for determination of economical reasonableness. This criterion prescribes an upper limit of $2,400 per dB/dwelling applied to the first floor of residences only. The MHD criterion was applied in developing noise mitigation performance standards for the MBTA's Old Colony commuter rail project.

Recently adopted MBTA policy provides for the expenditure of up to 2% of the project construction cost for noise and vibration impact mitigation. Consideration of the cost effectiveness of any noise mitigation measures must be weighted against the actual relief provided.

Receiver Noise Control

Although noise control at the receiver is usually less desirable, it provides an alternative approach where source or path treatments are not feasible. Potential mitigation measures include property acquisition or the installing of sound-insulation treatment to noise-sensitive buildings within the impact zone. One disadvantage of sound insulation is that it has no effect on outdoor noise. However, it may be the best choice for sites where noise barriers are not feasible.

Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) usually can be achieved by adding an extra layer of glazing to the windows, by improving the weather stripping around doors and windows, by sealing any holes in exterior surfaces that might admit sound and by providing forced ventilation and air conditioning so that windows do not need to be opened. If warranted, such treatments will be investigated by the MBTA during the final design phase.

Table 7.3-3 Summary of Potential Train Noise Mitigation - Expanded Service*

City/Town	Milepost		Number of Affected Residences	Potential Noise Barrier Length (ft)
	To	From		
Framingham	21.3	22.8	3	800
Ashland	22.8	26.4	12	1,000
Southborough	26.4	28.5	5	1,700
Westborough	28.5	35.8	32	5,650
Grafton	35.8	39.0	26	5,200
Millbury	39.0	39.6	0	0
Worcester	39.6	44.3	14	2,600
TOTALS			**92**	**16,950**

* *Under basic service, only 6 homes in Grafton would be affected. Potential noise barrier length is estimated to be 1,200 feet.*

Vibration Impacts from Train Operations

The changes in train equipment, schedules, and speeds along the Framingham to Worcester corridor that are proposed as part of this project have the potential to affect the ground-borne vibration environment along the corridor. Vibration impact criteria, projections, and assessment methodology are described in the Appendix.

The effects of ground-borne vibration include perceptible movement of the building floors, rattling of windows or items on shelves or walls, and "rumbling" sounds. In extreme cases, vibration can cause damage to buildings. Damage is not normally a factor for transportation projects, however, with the occasional exception of impact-type pile driving or blasting during construction. Annoyance with vibration often occurs when the level exceeds the threshold of perception by about 10 dB. This is an order of magnitude below the damage threshold for normal buildings.

The significance of vibration impacts from train operations on the project corridor was assessed based on the projected root-mean-square (rms) ground vibration velocity level (V_{dB}), expressed in decibels relative to one micro-inch per second. The criteria are given in terms of velocity because the sensitivity of humans, buildings and equipment to vibration typically has been found to correspond to a constant level of vibration velocity amplitude within the low frequency range of most concern for environmental vibration (roughly 5 to 100 Hz).

Because the project involves the introduction of commuter rail service to a rail line already in use, the vibration impact from trains was evaluated as follows: (1) MBTA commuter rail operations were assessed on an absolute scale defining a threshold which, if exceeded, would be judged to be a vibration impact, and (2) the increased speeds made possible by the project, which also will affect Amtrak and Conrail operations, were assessed on a relative scale, by which an *increase* of 2 V_{dB} or more, in addition to exceeding the absolute threshold, would be judged to be a vibration impact.

Vibration data from measurements performed in the study area to characterize existing vibration sources, in addition to data from measurements taken at a location east of Framingham where commuter trains are currently in service, were used to develop a model for estimating both existing and future vibration levels. Adjustments were made for speed and impact screening distances were determined for each segment of the corridor within which impact from train vibration is likely to occur.

It was found that with the exception of Conrail locomotives, which generated higher than expected ground-borne vibration levels, vibration from the three different train types (Amtrak, MBTA, and Conrail) are at about the same level at their respective

maximum speeds. Hence, the annoyance associated with vibration impacts identified along the right-of-way is likely to be related more to the increase in the number of vibration events, rather than elevated levels associated with a particular train type. Despite this observation, the introduction of MBTA commuter trains was assessed independently with respect to absolute vibration levels.

Since most Conrail freight trains are typically much longer than passenger trains and often consist of 30 or more freight cars hauled by only a few locomotives, the vibration generated by freight trains was assumed to be dominated by the freight cars. This assumption ensures a relatively conservative assessment by not overestimating the vibration created by existing freight traffic.

Table 7.3-4 provides a corridor-wide inventory of train vibration impact. This table estimates the number of residential units located within the vibration impact zone for both the basic and expanded service commuter rail scenarios. The vibration impact zones were determined by comparing the vibration projections with the project criteria along individual segments of the corridor, and by estimating the distances within which vibration impacts would occur. These train vibration impact distances, by corridor milepost segment are given in the Appendix. Residential buildings located within these zones were counted using aerial photographs of the project corridor and the number of units per building was estimated in the case of multi-family dwellings.

Table 7.3-4 Corridor-Wide Train Vibration Impact Inventory for Basic and Expanded Commuter Rail Service

City/Town	Milepost		Corridor Length (mi)	Number of Residences in Impact Zone
Framingham	21.3	22.8	1.5	3
Ashland	22.8	26.4	3.6	15
Southborough	26.4	28.5	2.1	1
Westborough	28.5	35.8	7.3	4
Grafton	35.8	39.0	3.2	10
Millbury	39.0	39.6	0.6	1
Worcester	39.6	44.3	4.7	7
TOTALS			**23.0**	**41**

Table 7.3-4 indicates that the results of the vibration impact assessment are the same for the basic and expanded service scenarios. This is because the assessment for MBTA trains is based on the anticipated train speed profile along the corridor, which, despite the difference in number of operations, is equivalent under both scenarios.

In addition, all of the impacts identified in Table 7.3-4 result from MBTA commuter trains. In no areas do the anticipated speed increases for Amtrak or Conrail operations cause relative vibration impact as defined by the criteria. It should also be noted that all of the significant vibration impacts reflect annoyance or activity interference effects associated with indoor vibration and not building or structural damage. In no case does the projected train vibration level along the corridor exceed the vibration damage criteria.

As in the noise impact assessment, most of the vibration impacts occur within close distances of the right-of-way. Over the entire corridor no vibration impact will occur beyond about 100 ft of the nearest track centerline. The largest number of impacts are in Ashland and Grafton, where the right-of-way passes through some residential areas with residences as close as 50 ft. In general, the vibration impacts occur in areas where commuter trains will be travelling at or close to their maximum speed of 70 mph.

Train Vibration Mitigation

The train vibration evaluation projects a total of 41 impacted residences for both basic and full service commuter rail operations. The analysis also indicates that the primary areas of impact are expected to be where train speeds approach their upper limits. The vibration impact analysis was conducted assuming baseline conditions of continuously welded rail (CWR) in good condition on wood tie-and-ballast track. As for train noise, source, path and receiver vibration impact mitigation measures have been considered as described below.

Source Vibration Control

Train vibration control at the source can involve equipment and track-related measures as well as operational modifications. Since the source of ground-borne vibration is the wheel/rail interaction, equipment and track-related measures are essentially limited to ensuring good maintenance practices. However, maintenance alone cannot be relied upon to provide the required vibration mitigation.

While another vibration mitigation measure at the source would be a reduction in train speed, such operational modifications are not feasible to meet the objectives of the project, since speed reductions of 50% would be required to eliminate vibration impacts.

Path Vibration Control

Potential path vibration control treatments include (1) ballast mats, (2) floating slabs, and (3) trenches or underground barriers. These measures are discussed below.

- **Ballast Mats.** Ballast mats typically consist of a 2 to 3 inch thick elastomer mat placed under the normal track ballast on a rigid, well-packed sub-grade. Most ballast mat installations are supported on concrete foundations in subway tunnels or on concrete railroad bridges. Although there are some examples of ballast mats being installed for at-grade track, there are limited data on the effectiveness of at-grade installation. Available information indicates that ballast mats could reduce vibration levels along the project corridor by 3 to 6 dB in some locations, sufficient to eliminate 90% of the projected vibration impact in those areas, assuming "normal" geological conditions.

  The main disadvantage of ballast mats is that they tend to be particularly costly for retrofit installations and may not be cost-effective to protect only a few houses.

- **Floating Slabs.** Floating slabs consist of 1-ft thick or thicker concrete slabs supported by resilient pads on a concrete foundation. The tracks are mounted on top of the floating slabs. Most successful floating slab installations are in subways. To use them with at-grade track, a concrete foundation must first be constructed for the slab to work against.

  Construction of a floating slab track bed is significantly more expensive than tie and ballast at-grade track construction, even with ballast mats. Therefore, floating slabs are unlikely to be cost effective for this project.

- **Trenches or Underground Barriers.** Although rarely used, a deep trench, 30 to 80 ft deep, along one or both sides of the tracks can be an effective barrier to ground-borne vibration. The trench can be either open or filled with a material such as closed-cell foam or concrete. However, this is not likely to be a viable option for this project corridor. A deep trench test performed in Toronto, Canada produced only marginal results in terms of vibration attenuation.

Floating slabs and trenches are discussed here only to offer an idea of what alternative options are available for vibration control and should not be considered practical, "everyday" solutions. Floating slabs for at-grade track have rarely been implemented in this country; although two examples exist in the San Francisco area. One is on the Muni light rail line in downtown San Francisco, in which a short portion of embedded track was built using a floating slab and subsequent tests showed substantial attenuation of vibrations. Another application is for a new BART line under construction, in an area found to have particularly efficient ground vibration propagation conditions, and an at-grade floating slab was judged to be the only method of effective mitigation. It is usually possible to control vibration with less expensive measures, such as ballast mats.

Receiver Vibration Control

Practical vibration mitigation measures at the receiver are generally limited to property acquisition or the purchase of vibration easements. In cases where the cost of reducing ground-borne vibration levels to acceptable limits exceeds the value of the affected property, such measures may provide the most cost-effective means for train vibration impact mitigation.

Of the above measures, ballast mats appear to have the greatest potential to provide reliable and effective train vibration impact mitigation. A summary of the potential extent of this treatment is provided in Table 7.3-5, based on the vibration impact inventory. This table provides rough estimates of the length and cost of ballast mat needed to mitigate all train vibration impact for the basic and full service "Build" alternatives in each community along the project corridor. The actual locations of the mats would be within corridor milepost segments where vibration impact is projected to occur, as provided in the Appendix.

Lengths for ballast mats were estimated by assuming that at least 200 feet (approximately one quarter of the length of a train) of rail corridor would need to be treated to protect each affected residence, except in more densely populated areas where the lengths were estimated from plan maps. Mitigation cost estimates can be made based on 12.5-ft wide ballast mats for each of the two tracks, at an installed cost of $15 per square foot. The total cost for ballast mat vibration impact mitigation is estimated to be about $1,700,000.

Table 7.3-5 Summary of Potential Train Vibration Mitigation

City/Town	Milepost		# Residences Impacted	Potential Ballast Mat Length (ft)
	From	To		
Framingham	21.3	22.8	3	350
Ashland	22.8	26.4	15	1250
Southborough	26.4	28.5	1	200
Westborough	28.5	35.8	4	600
Grafton	35.8	39.0	10	1450
Millbury	39.0	39.6	1	200
Worcester	39.6	44.3	7	600
TOTALS			**41**	**4,650**

Ballast mat locations, lengths, and widths developed in this study are preliminary. Site-specific investigations will be required during the final design phase of the project to determine where the use of ballast mats would be effective and feasible. Some of the factors that must be addressed are the frequency content of the

ground-borne vibration at specific locations, which affects the performance of this treatment, as well as cost effectiveness.

With regard to feasibility, ballast mats may not be able to provide sufficient vibration reduction at locations where the ground-borne train vibration is dominated by very low-frequency components. Furthermore, ballast mats may not be cost effective in areas where a small number of homes are to be protected. During final design it also will be necessary to determine these factors, as well as specify the ballast mat material and installation procedure to ensure adequate train vibration control.

Construction Impacts/Mitigation

Although construction activities related to the Worcester commuter rail extension would be short-term in nature, these activities have the potential to cause noise impact at nearby residences depending on their intensity and schedule. Noise impact criteria and assessment methodology are described in the Appendix, with results of the impact assessment given below.

Project right-of-way construction would consist of (1) construction of additional mainline track from MP 33 to 40, (2) reconstruction of the existing mainline track from MP 40 to 44, (3) modifications at bridges, and (4) lowering tracks to accommodate vertical clearance requirements.

Track work such as undercutting and track installation were found to have minimal potential for noise or vibration impact, particularly since these activities would be confined mostly to the center of the right-of-way. It was found that beyond a distance of about 15 to 20 ft from the right-of-way centerline, the projected noise and vibration levels from track work were well below the criteria used for construction. Thus, even those residences closest to the rail corridor would be outside the impact zone. Bridge modifications, however, may result in significant impacts and are discussed below.

Noise from Bridge Construction

Equipment for bridge replacement will include cranes, trucks, jacks, material-handling equipment, and other heavy-duty construction equipment. Depending on foundation requirements, pile driving may be required for reconstruction of the Route 85 bridge in Southborough (MP 27.4). Bridge work is expected to be carried out during normal daylight hours, with an approximate duration of 3 to 9 months; pile driving, if required, would require only 2 to 3 weeks of time.

Worst-case noise impact screening distances for the bridge replacement/ reconstruction were estimated to be about 630 ft from the closest point of

construction, assuming pile driving will be required. This would result in a total of six residences impacted by construction noise, all of which are located in Southborough.

The Massachusetts Highway Department (MHD) will be reconstructing bridges over the rail corridor at Fountain Street (Framingham), High Street (Ashland), Pine Street (Grafton) and Hamilton Street (Worcester). These bridges will be advertised and constructed independently of the MBTA commuter rail project, and any related noise impacts would be addressed by the MHD.

Vibration from Bridge Construction

The greatest potential source of vibration impact is pile driving for bridge replacement/construction, with a screening distance of 210 ft to impact. It was found, however, that no residences or other sensitive receptor sites were located within this distance of the Route 85 bridge construction site.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures will be incorporated in project specifications where appropriate:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

7.4 Right-of-Way Drainage

Drainage along the mainline rail bed has been considered separately from drainage of the proposed station sites. The main objective in considering drainage impacts on adjacent properties is to prevent changes in existing flow patterns. The existing rail bed provides a favorable circumstance, since all major water course crossings are in place. Since no major realignment work is proposed, no new crossings are required.

The focus of this investigation is on the area of proposed restoration of the second track. The limits of the "new" track are between Mile Posts 33.35 in Westborough and 40.32 in Worcester. The subgrade and ballast still exist for the eastbound line, which was retired from service about ten years ago.

Improvements where the second track exists will include minor adjustments to the existing rail and replacement of ties where necessary. No impacts on culverts or ditching will result from these maintenance tasks.

Table 7.4-1 lists the 20 culvert crossings known to existing within the limits of the "new track". The culverts have been identified from a compilation of several sources:

- Major water course crossings were readily available on U.S.G.S. quadrangles.
- Intermittent streams and adjacent wetland resources were visible from the topographic data generated by aerial mapping.
- Field inspection provided the location of spray markers, which signal the location of most culverts.

Table 7.4-1 Culvert Crossings Along Mainline

Culvert	Figure 7.4-2 Sheet #	Mile Post	Description
C-1	2	40.14	4'x4'6" Stone Box
C-2	2	39.77	2'x'2 Stone Box
C-3	4	38.80	24" Cast Iron Pipe
C-4	6	38.24	Stone Arch
C-5	7	37.61	(3) 2'7"x4'2" Stone Boxes
C-6	7	37.54	8' Wide Stone Box
C-7	8	37.27	3' x 3' Stone Box
C-8	8	37.07	16" Cast Iron Pipe
C-9	8	36.91	16" Cast Iron Pipe
C-10	10	36.35	12" Concrete Pipe
C-11	11	36.07	18" Cast Iron Pipe
C-12	11	35.91	1'6" x1'6" Stone Box
C-13	11	35.75	3'x4' Stone Box
C-14	12	35.58	2'x2' Stone Box
C-15	12	35.56	2'x3' Stone Box
C-16	12	35.30	2'x2' Stone Box
C-17	13	34.74	4'x5' Stone Box
C-18	14	34.39	2'6"x2' Stone Box
C-19	15	33.89	8" Cast Iron Pipe
C-20	15	33.80	12" Cast Iron Pipe

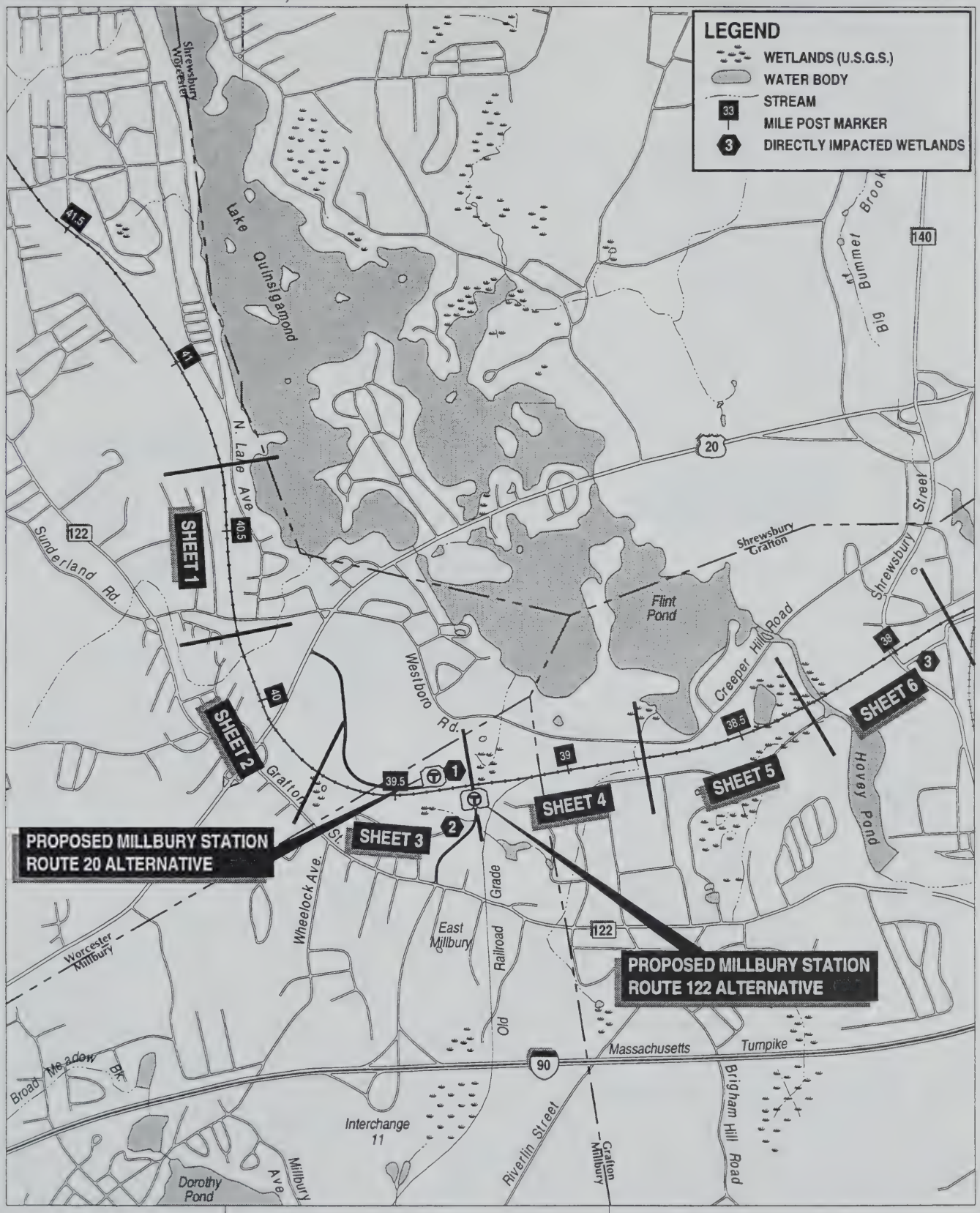
On the following pages, Figure 7.4-1, sheets 1 through 3 provides a key map for Figure 7.4-2, sheets 1 through 16, which depicts 1" = 200' scale mapping along the length of rail corridor where the second track is to be restored.

The general condition of these culverts in the restored track corridor is good, however the inlet and outlet areas are overgrown with vegetation. Several of the culverts were inaccessible due to the overgrowth and other obstructions. Routine maintenance work would enhance the condition of the existing drainage patterns by removing partial blockages to keep the system functioning adequately.

While no new culverts are proposed, it may become necessary to extend an existing culvert to accommodate rail and ballast adjustments. This possibility is currently under review in the area of culvert C-10, east of Pine Street in Grafton. An increased length of 5'-10' may be anticipated (See Section 7.5 for additional discussion).

The existing side ditches running parallel to the tracks in the restored track corridor are functioning well in general. Routine cleaning of all culvert inlets and removal of debris and overgrowth will satisfy most areas. A specific area currently being studied is the ditch on the south side of tracks between the Route 140 bridge and the pedestrian underpass in Grafton. (See Figure 7.4-2, sheet 6 of 16). This vegetated ditch is discussed as direct impact Area 3 in Section 7.5, "Wetlands and Wildlife". This ditch has no known inlet or outlet and its retention characteristics would be preserved. Alternatives currently under review are either to direct this drainage towards Big Bummet Brook, (1,100' East) or regrade a new ditch to provide the same storage characteristics beside its current location. Figure 7.4-3 shows drainage and wetlands impact details.

A flood storage impact analysis also has been done for the restored track corridor. Inspection of the flood insurance rate maps indicates several areas of the mainline crossing near graphical limits of a 100 year flood. In some cases an elevation study has been done and this limit has been transferred to the 200 scale maps. In areas where no elevation study has been done, an estimated 100 year flood crest has been approximated utilizing the graphical areas overlayed on contour maps. In both cases, no impact to flood storage capacity is anticipated along the mainline. There will be a crossing of bordering land subject to flooding (BLSF) at the Southborough Station site. This is discussed in Section 15.5, Wetlands and Wildlife.



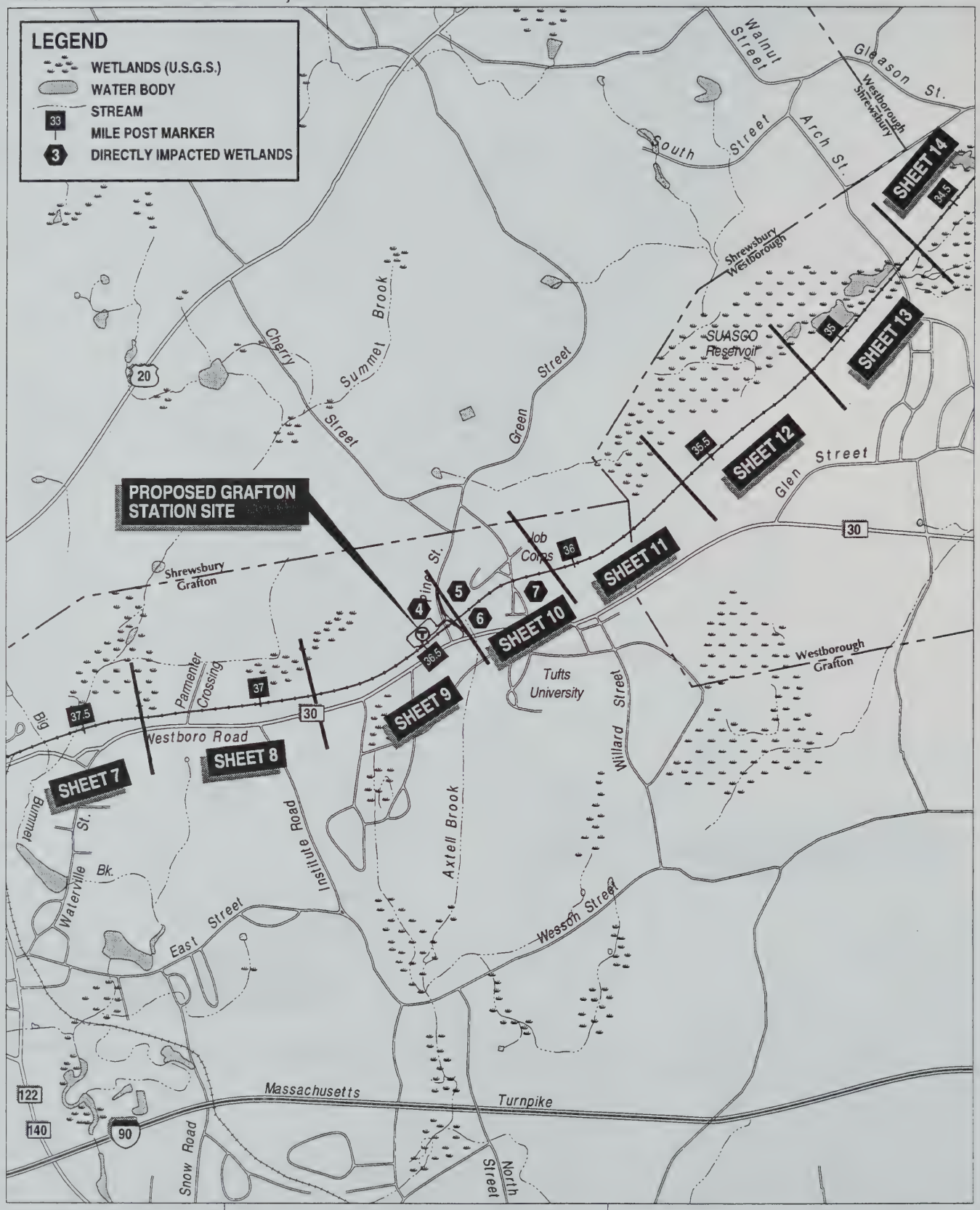
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

0 2000

KEY MAP
Corridor Drainage and Wetlands Related to New Track Work

FIGURE 7.4-1 PANEL 1 OF 3



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'
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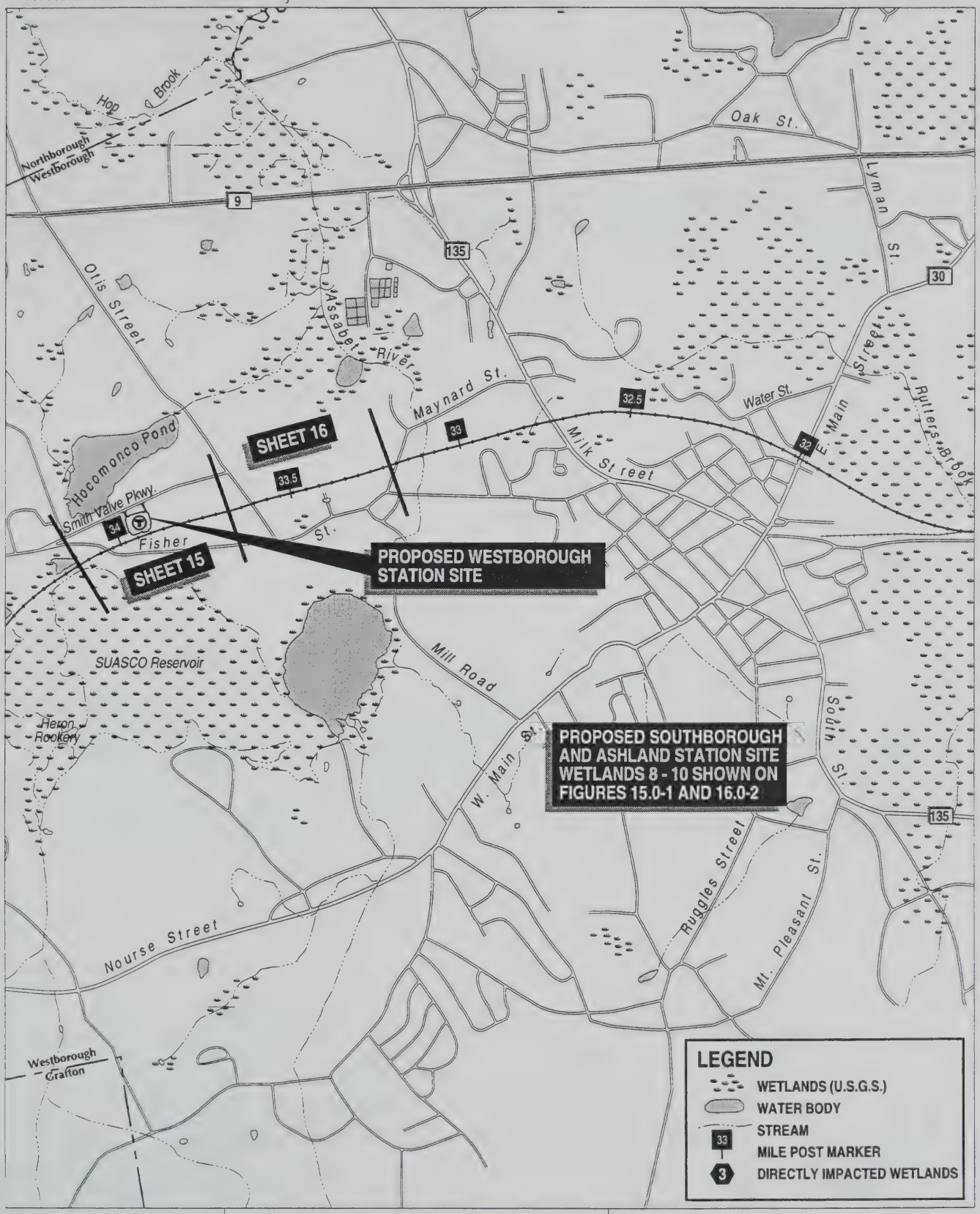
KEY MAP
Corridor Drainage and Wetlands Related to New Track Work

FIGURE 7.4-1 PANEL 2 OF 3



MATCH LINE - SEE PANEL 3 OF 8

MATCH LINE - SEE PANEL 5 OF 8

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

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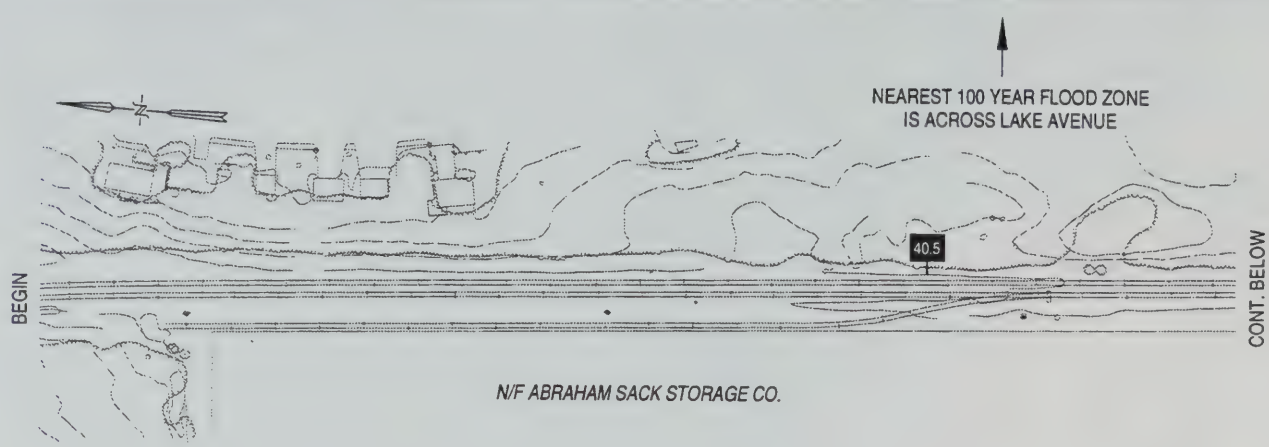
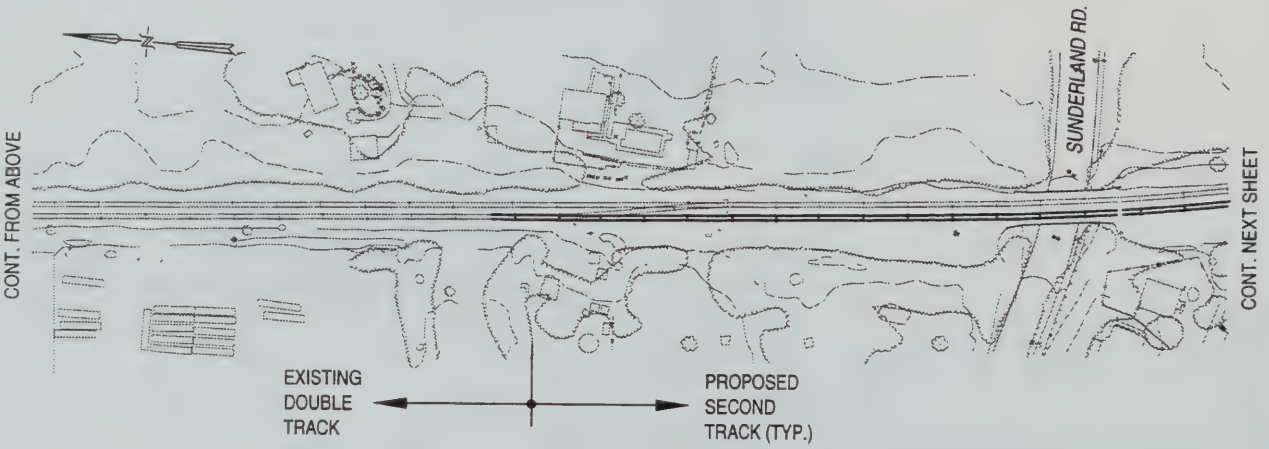
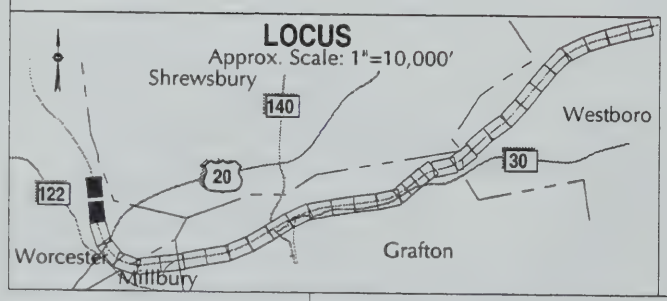
KEY MAP
Corridor Drainage and Wetlands Related to New Track Work

FIGURE 7.4-1 PANEL 3 OF 3







LEGEND

- WETLANDS (U.S.G.S.)
- WATER BODY
- STREAM
- 33 MILE POST MARKER
- 3 DIRECTLY IMPACTED WETLANDS
- C-3 EXISTING CULVERT

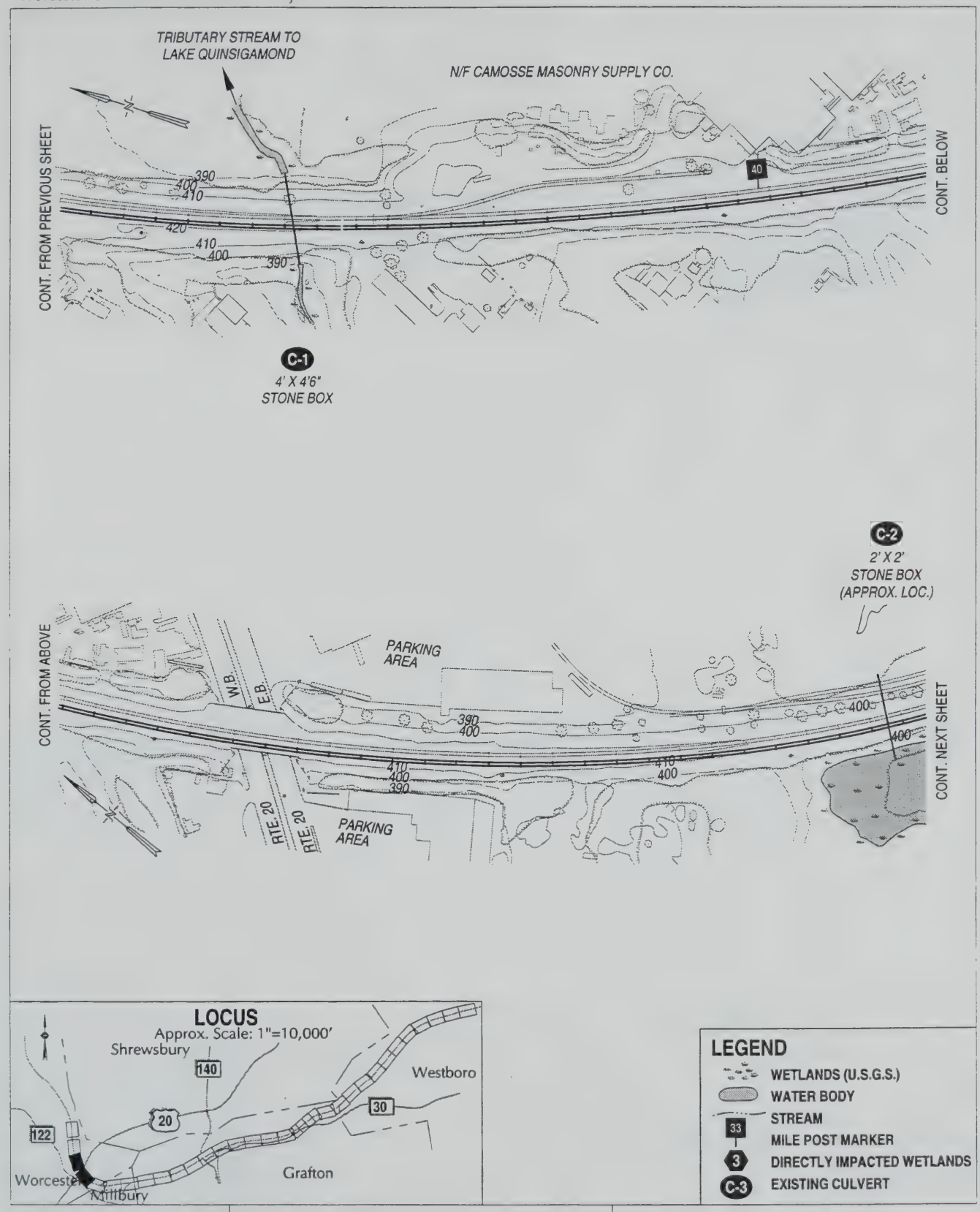
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 1 OF 16



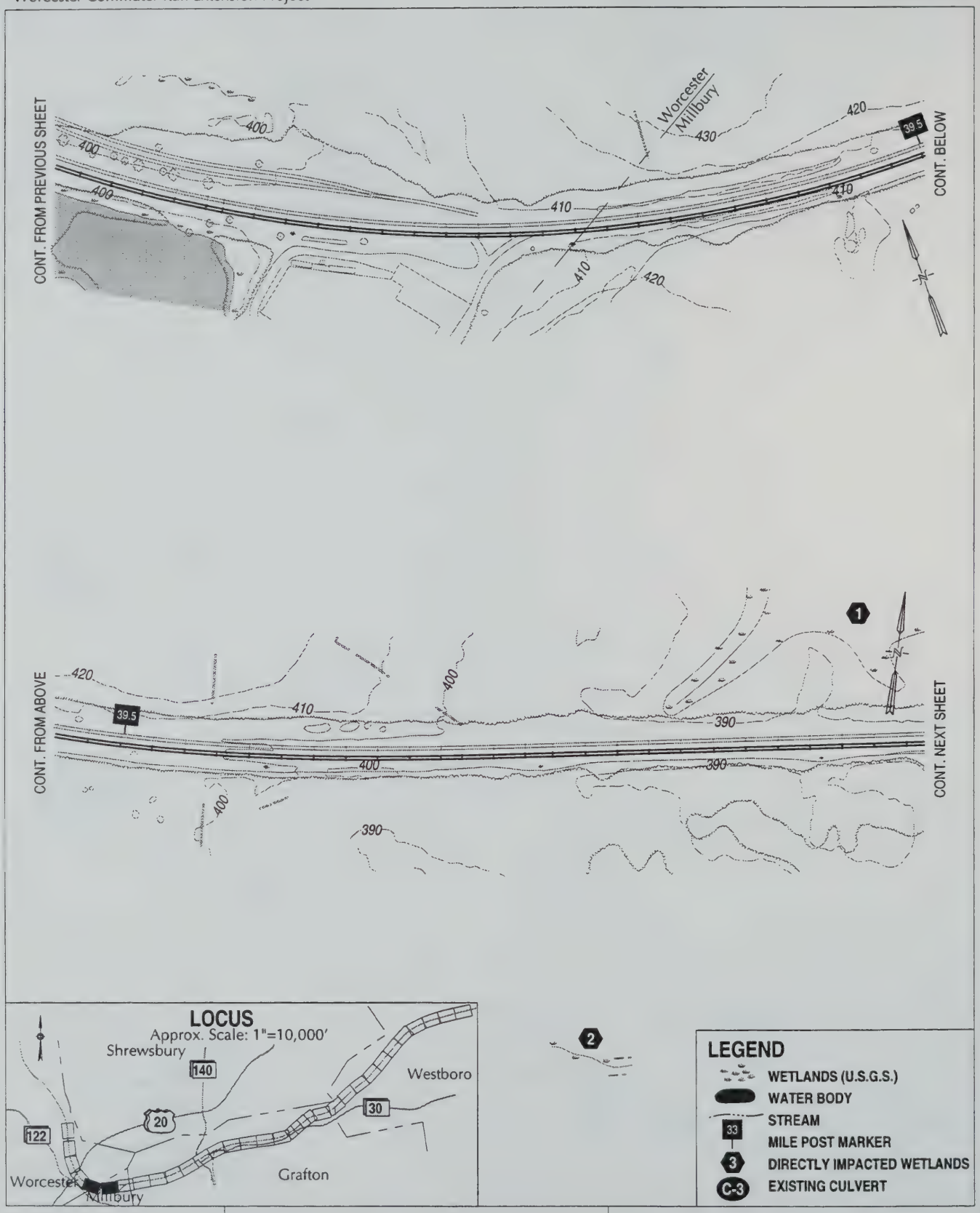
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 2 OF 16



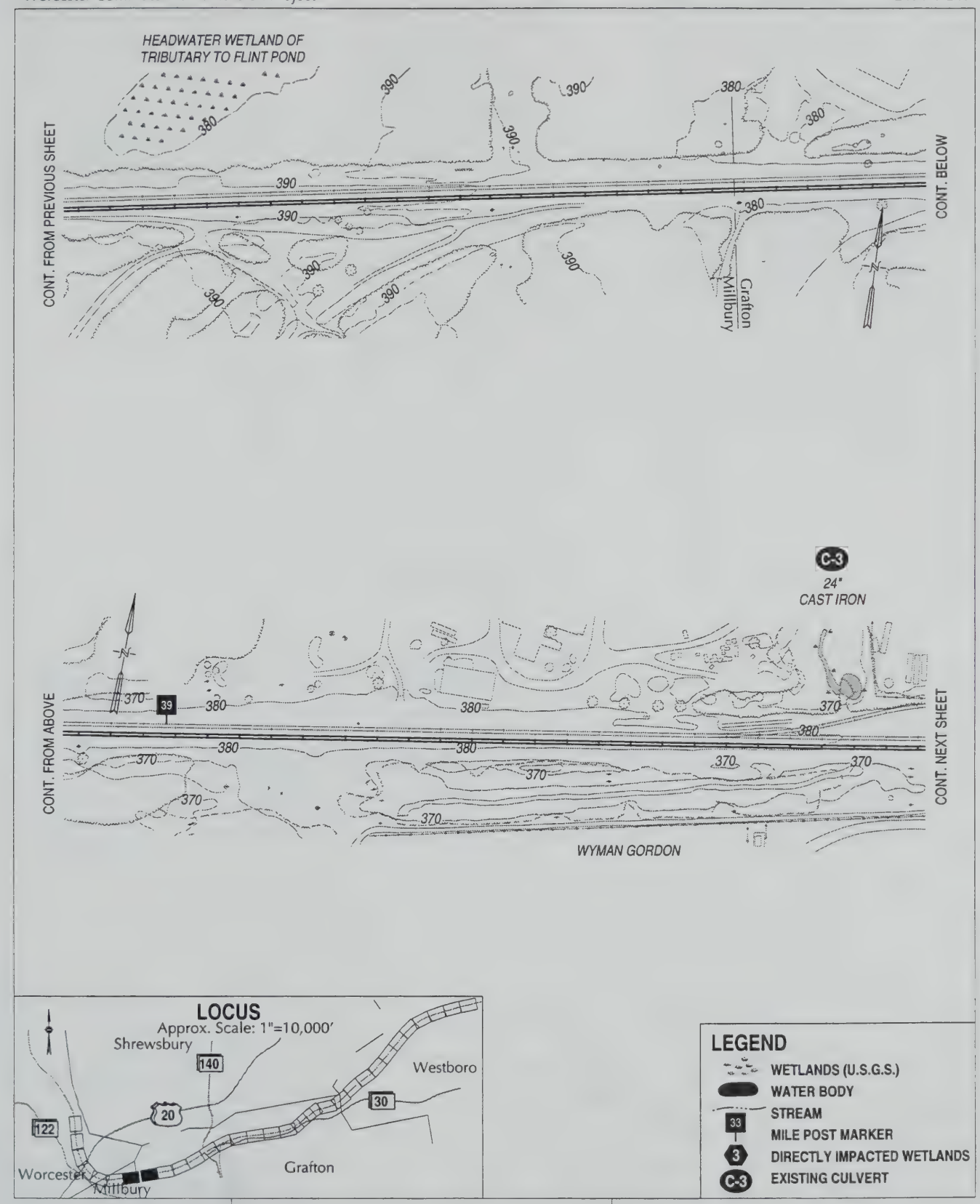
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 3 OF 16



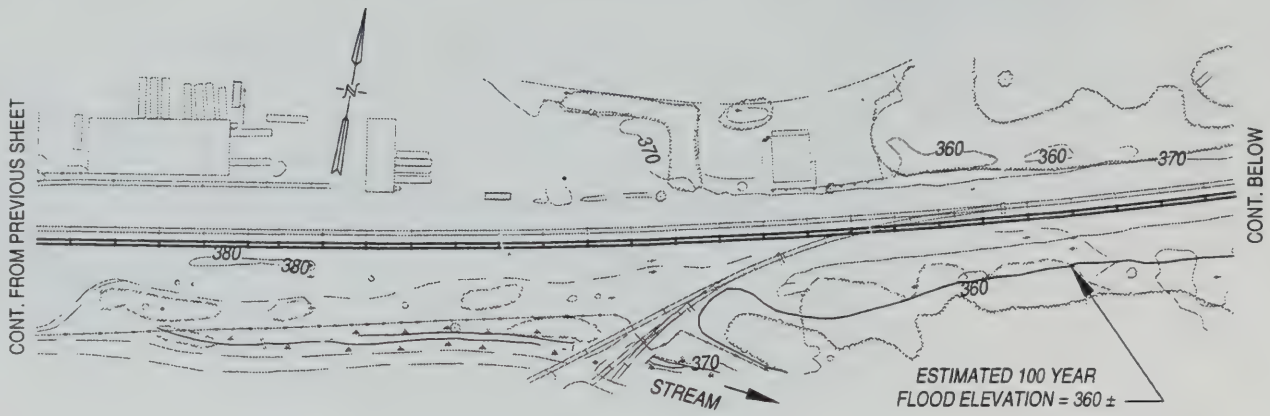
Massachusetts Bay Transportation Authority

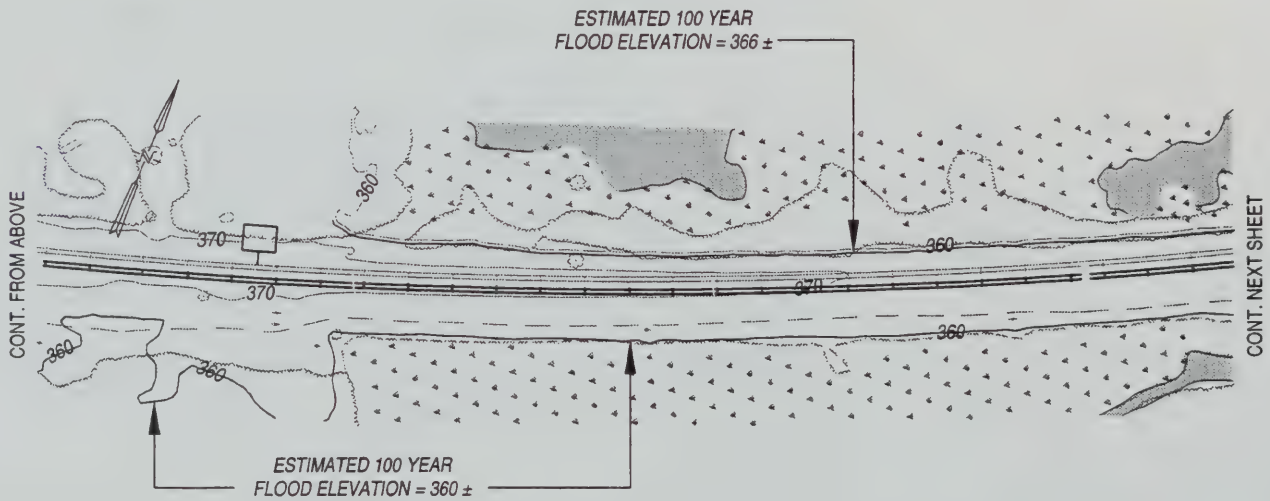
Approx. Scale: 1" = 200'

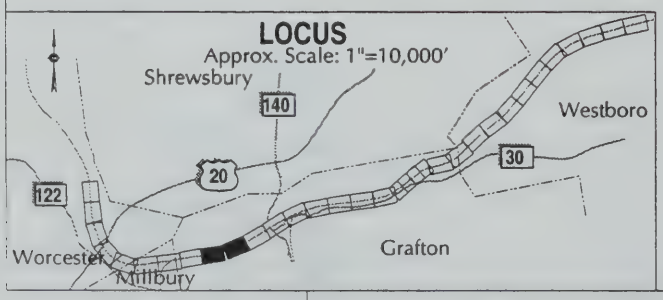
0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 4 OF 16







LEGEND

- WETLANDS (U.S.G.S.)
- WATER BODY
- STREAM
- 33 MILE POST MARKER
- 3 DIRECTLY IMPACTED WETLANDS
- C-3 EXISTING CULVERT

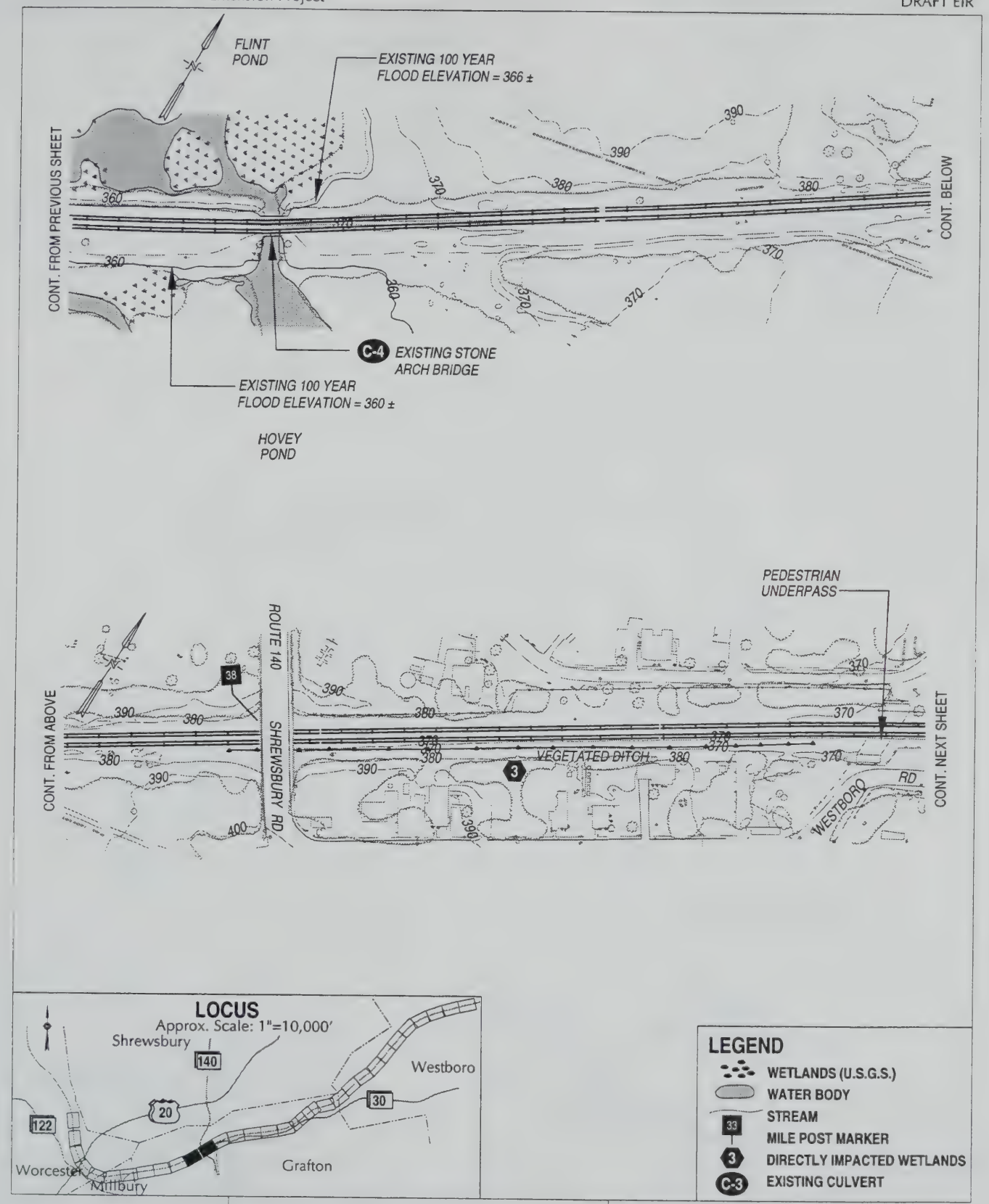
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

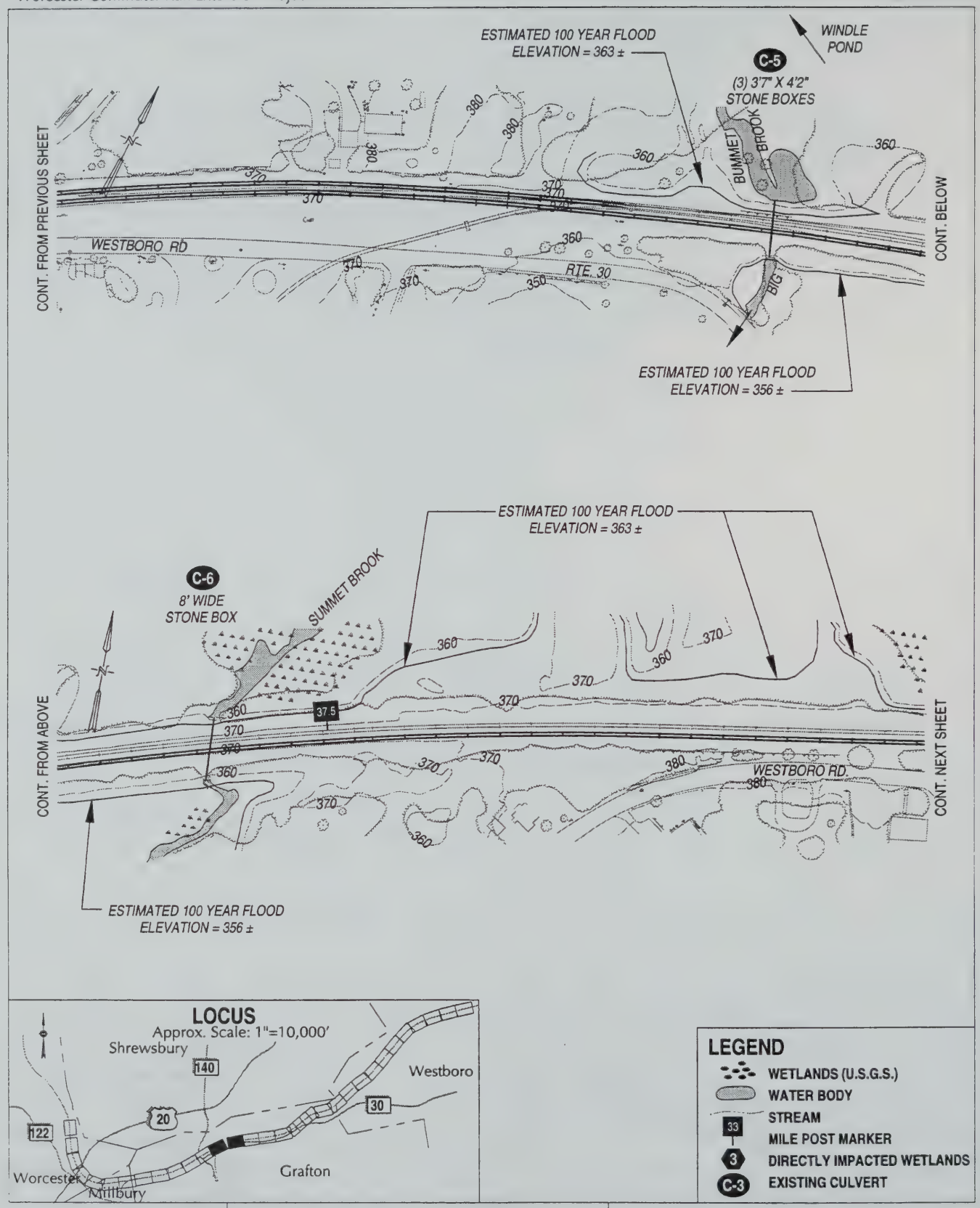
CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 5 OF 16



CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 6 OF 16



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

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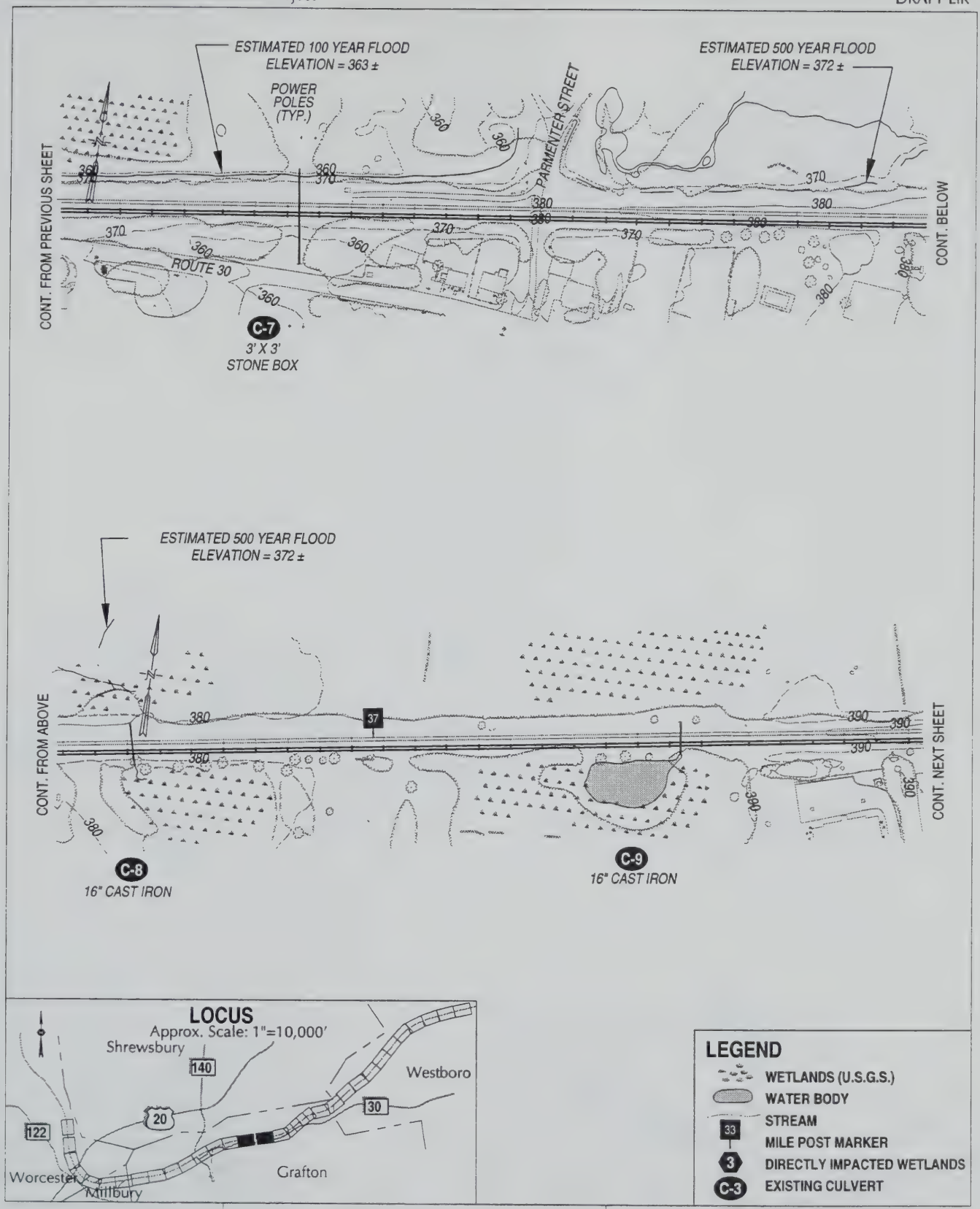
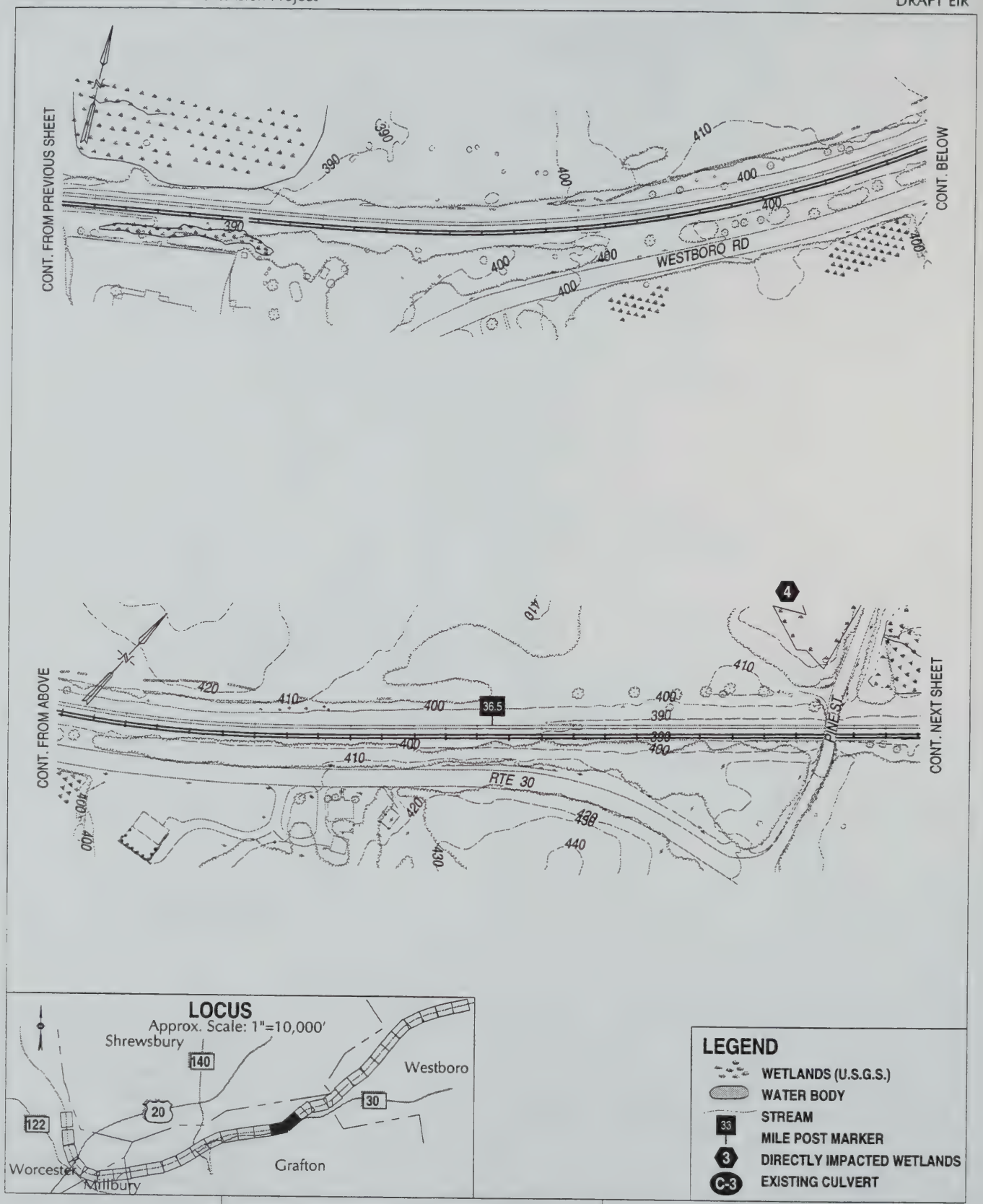
CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 7 OF 16



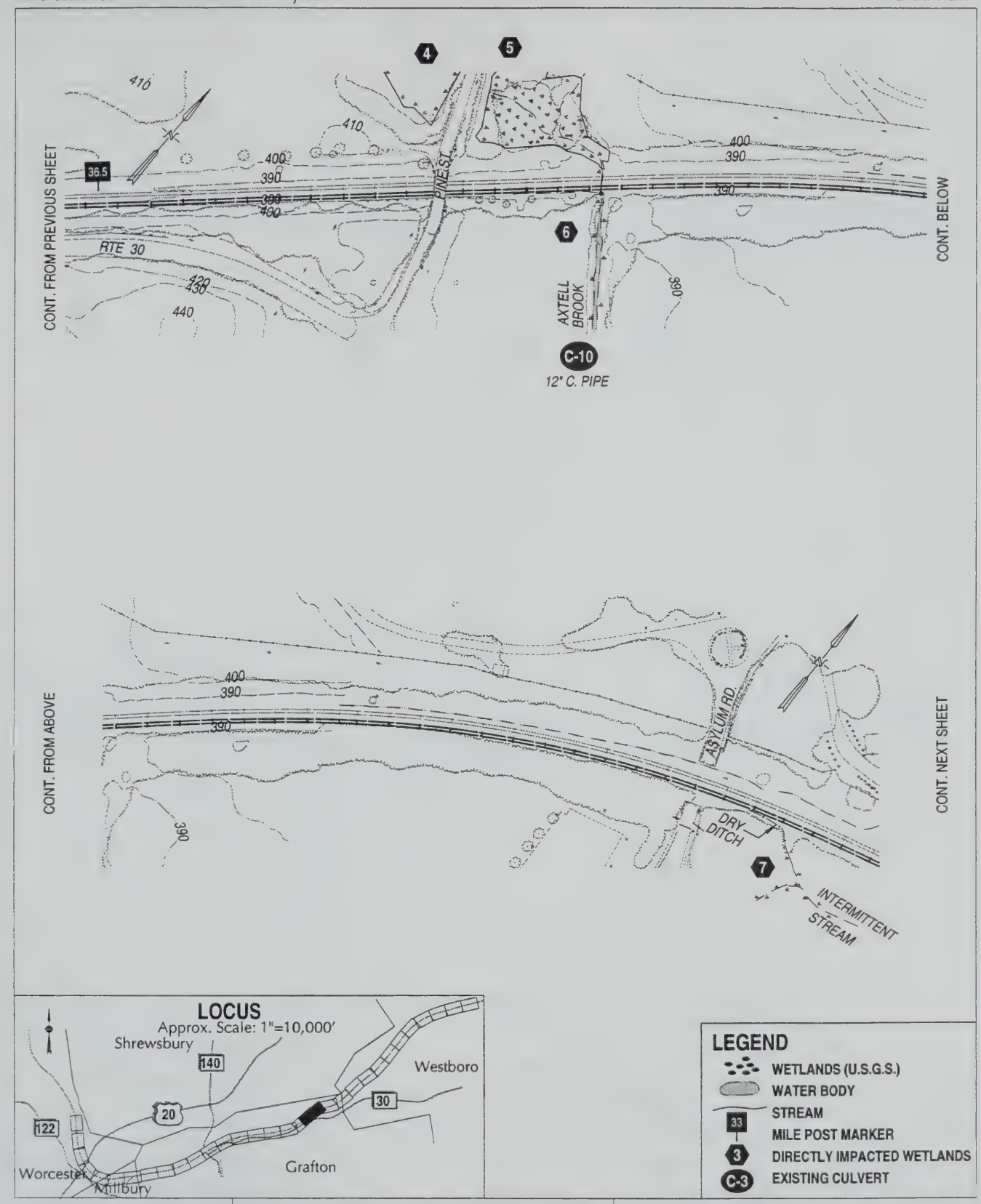
CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 8 OF 16



CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 9 OF 16



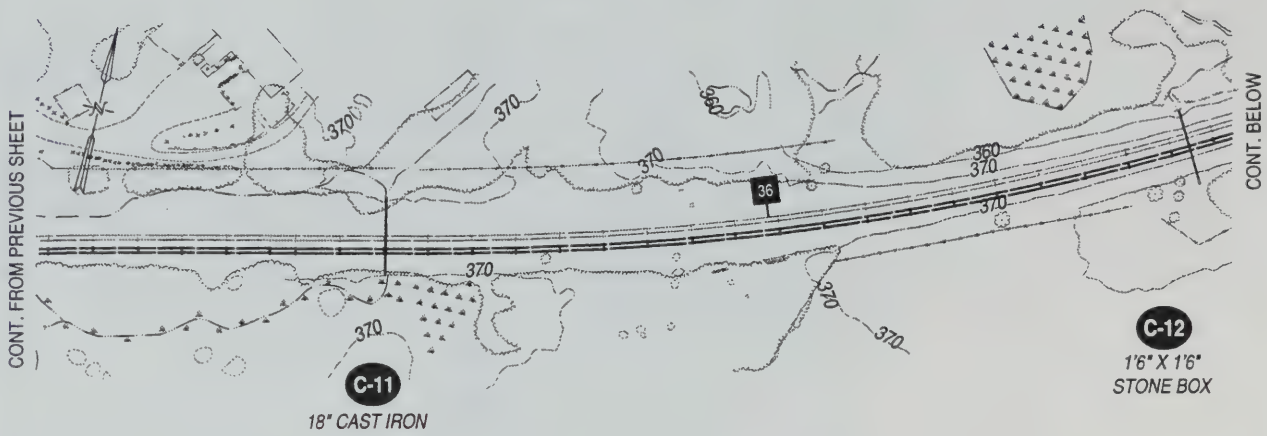
Massachusetts Bay Transportation Authority

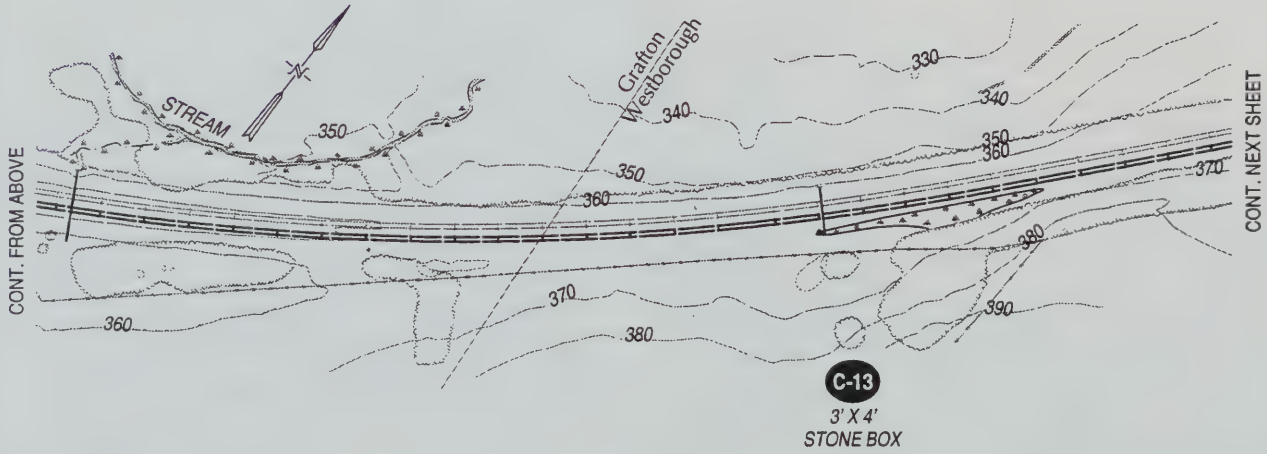
Approx. Scale: 1" = 200'

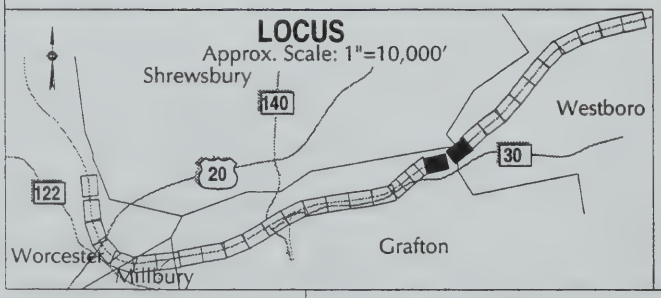
0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 10 OF 16







LEGEND

- WETLANDS (U.S.G.S.)
- WATER BODY
- STREAM
- 33 MILE POST MARKER
- 3 DIRECTLY IMPACTED WETLANDS
- C-3 EXISTING CULVERT

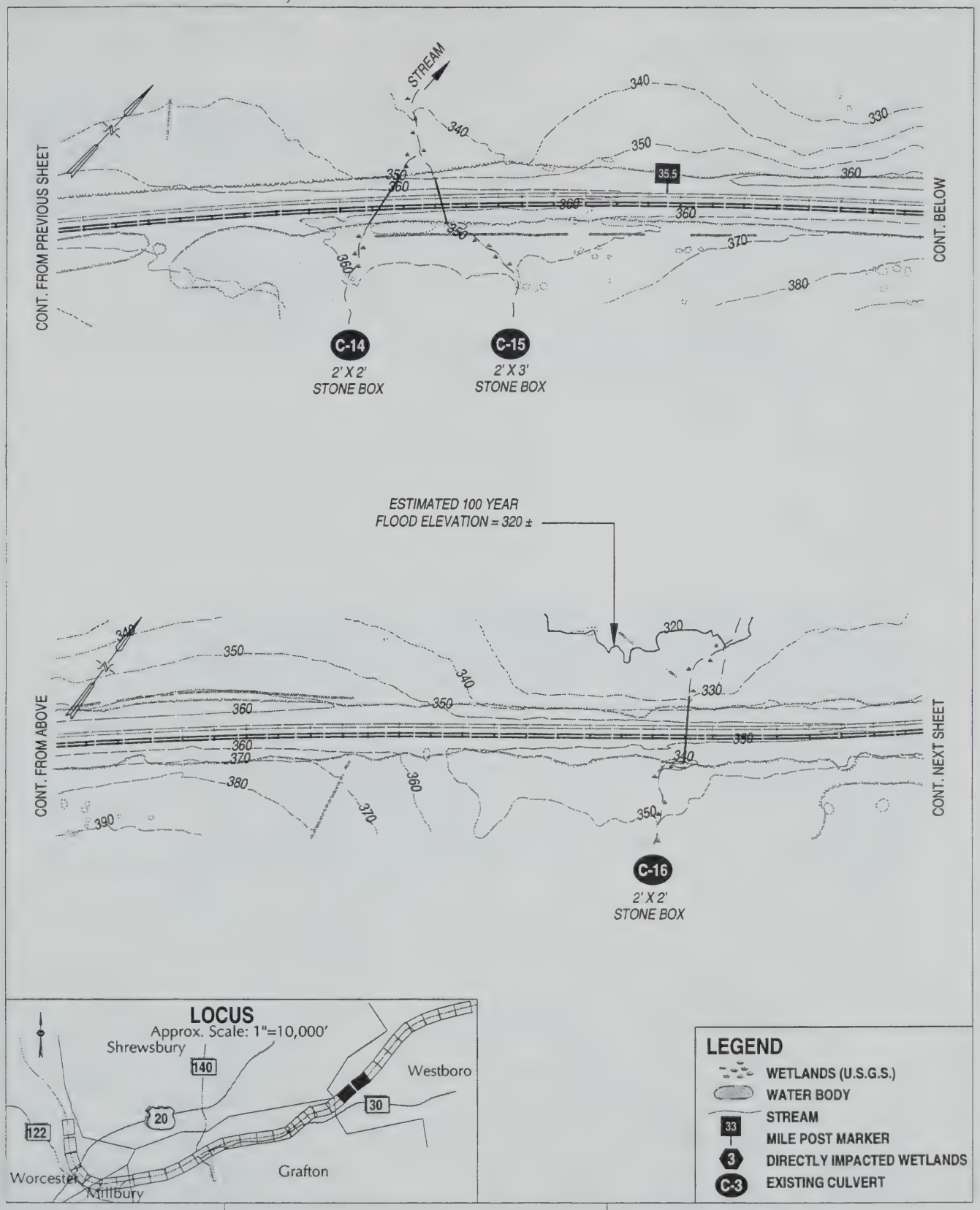
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 11 OF 16



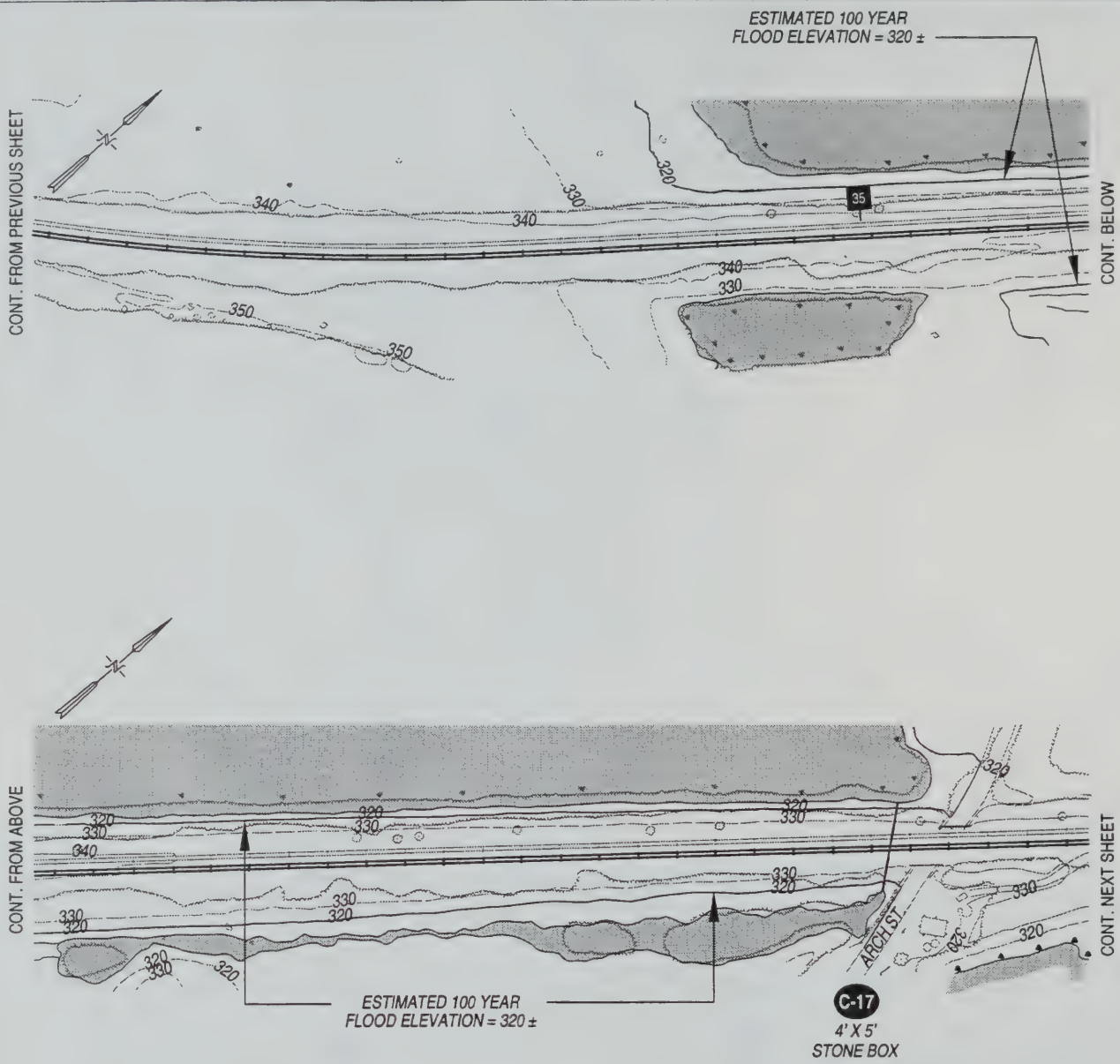
Massachusetts Bay Transportation Authority

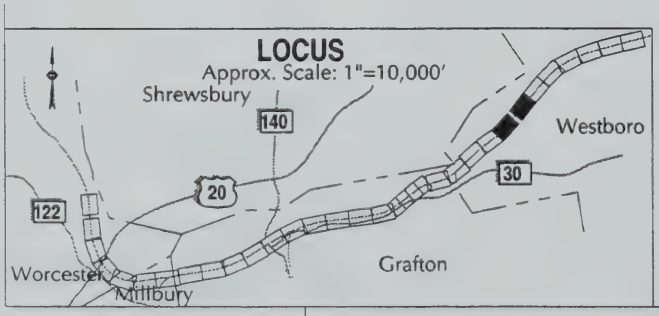
Approx. Scale: 1" = 200'

0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 12 OF 16





LEGEND

- WETLANDS (U.S.G.S.)
- WATER BODY
- STREAM
- 33 MILE POST MARKER
- 3 DIRECTLY IMPACTED WETLANDS
- C-3 EXISTING CULVERT

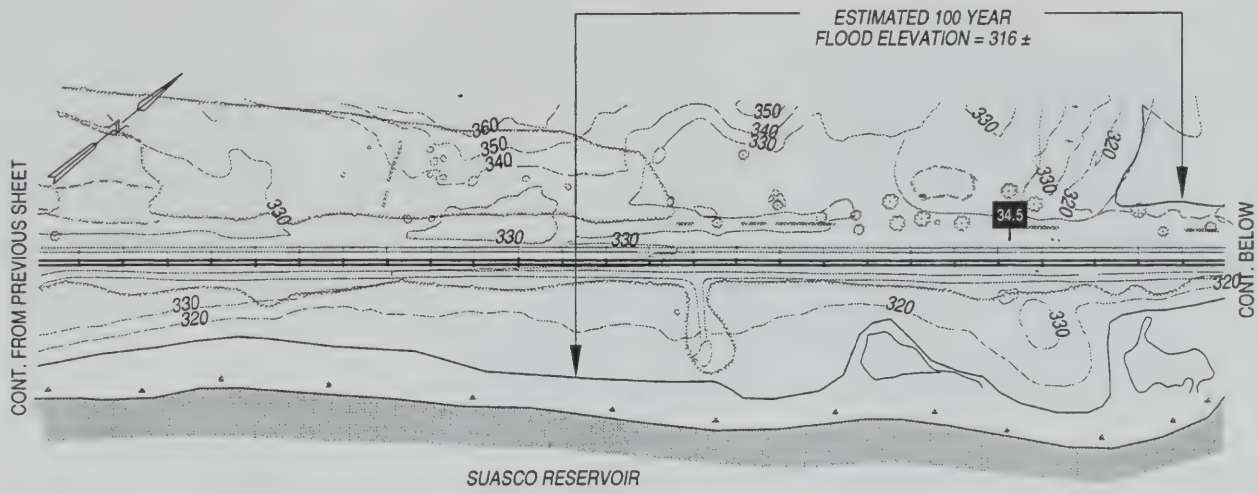
Massachusetts Bay Transportation Authority

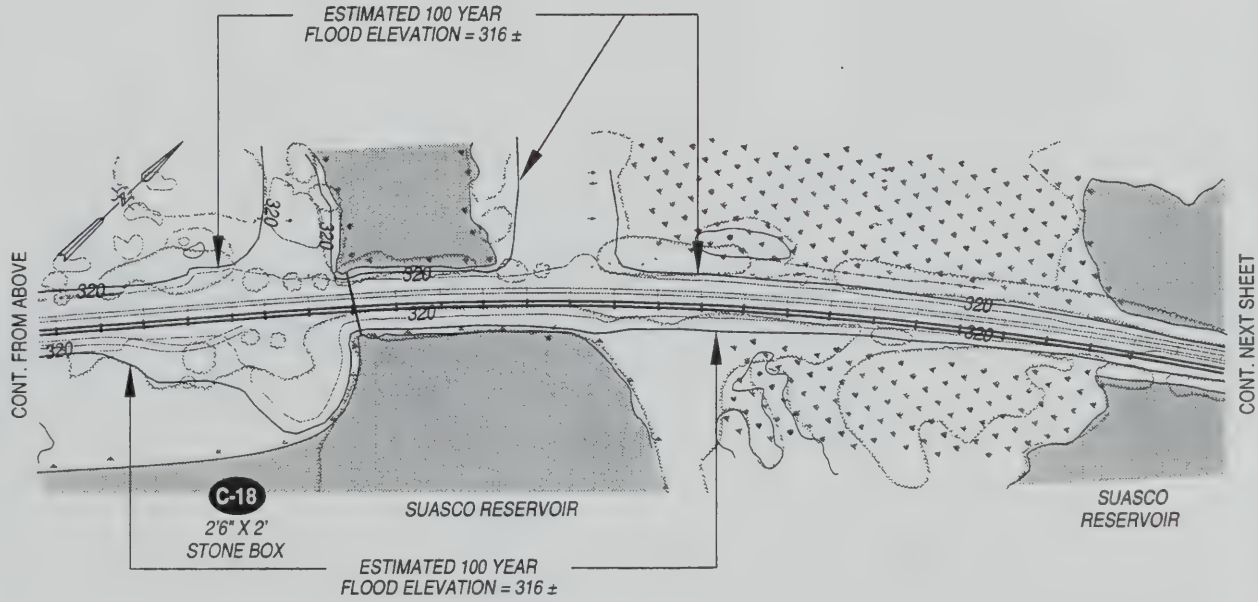
Approx. Scale: 1" = 200'

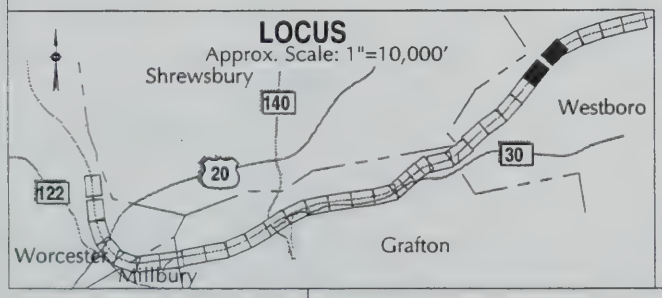
0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 13 OF 16







LEGEND

- WETLANDS (U.S.G.S.)
- WATER BODY
- STREAM
- 33 MILE POST MARKER
- 3 DIRECTLY IMPACTED WETLANDS
- C-3 EXISTING CULVERT

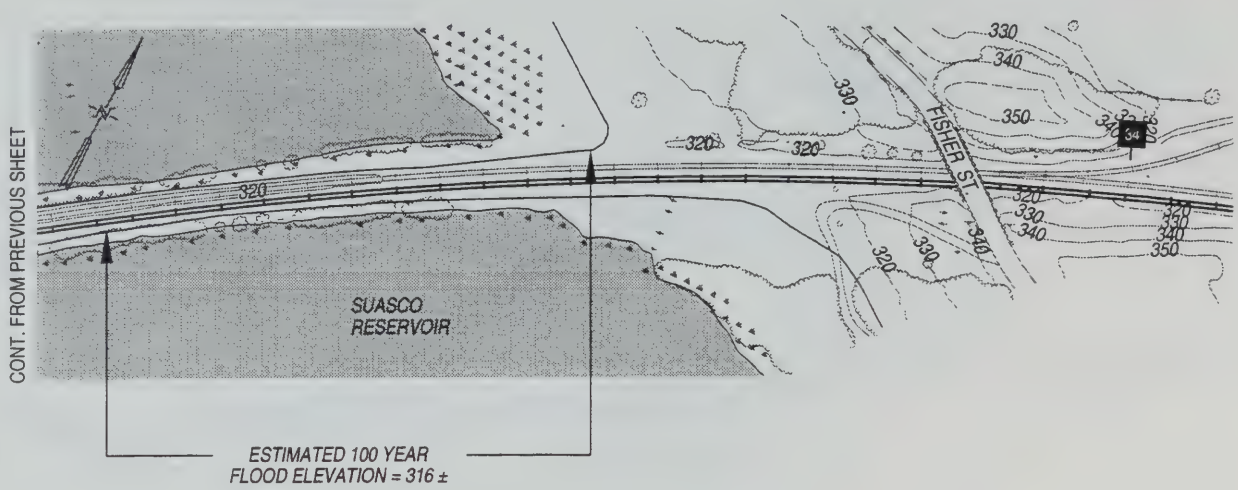
Massachusetts Bay Transportation Authority

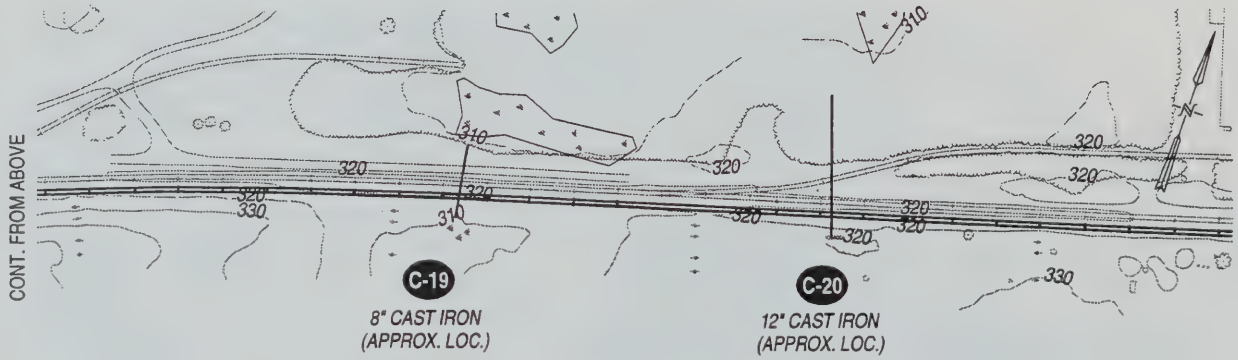
Approx. Scale: 1" = 200'

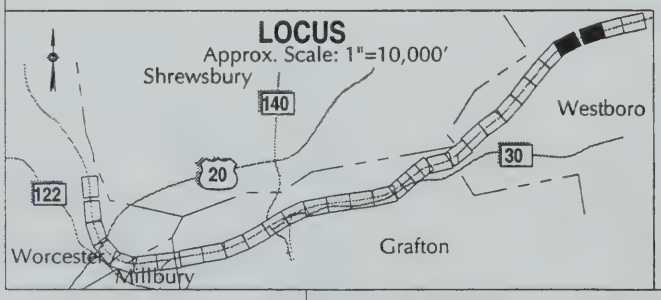
0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 14 OF 16







LEGEND

- WETLANDS (U.S.G.S.)
- WATER BODY
- STREAM
- 33 MILE POST MARKER
- 3 DIRECTLY IMPACTED WETLANDS
- C-3 EXISTING CULVERT

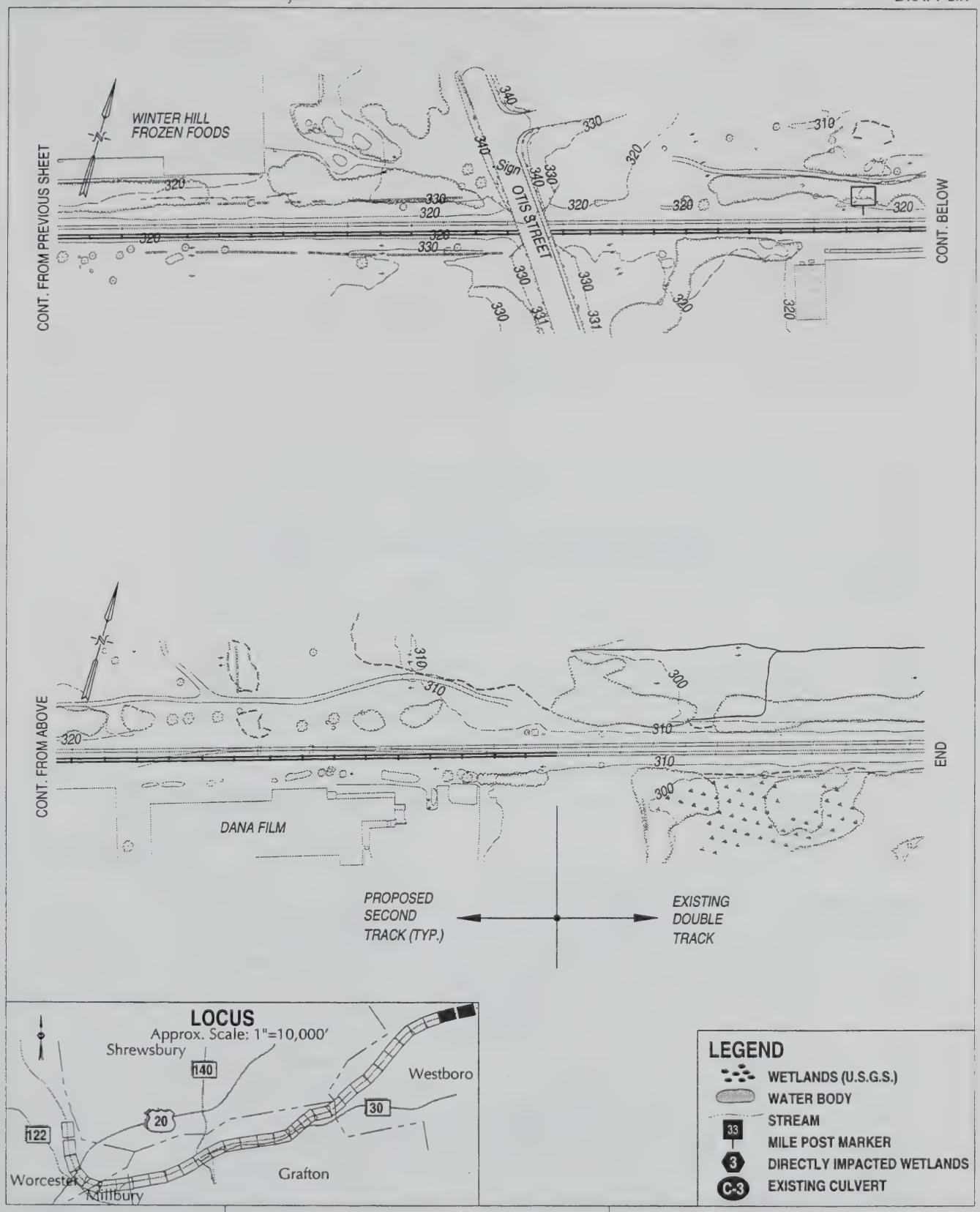
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

CORRIDOR DRAINAGE AND WETLANDS MAP

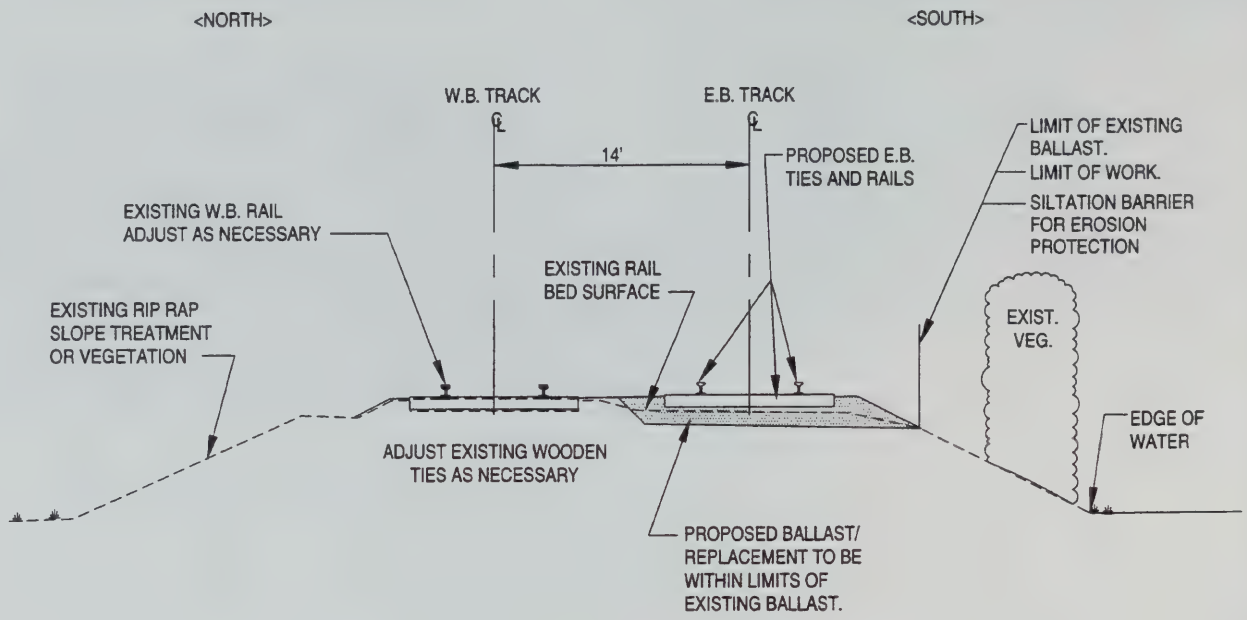
FIGURE 7.4-2 SHEET 15 OF 16



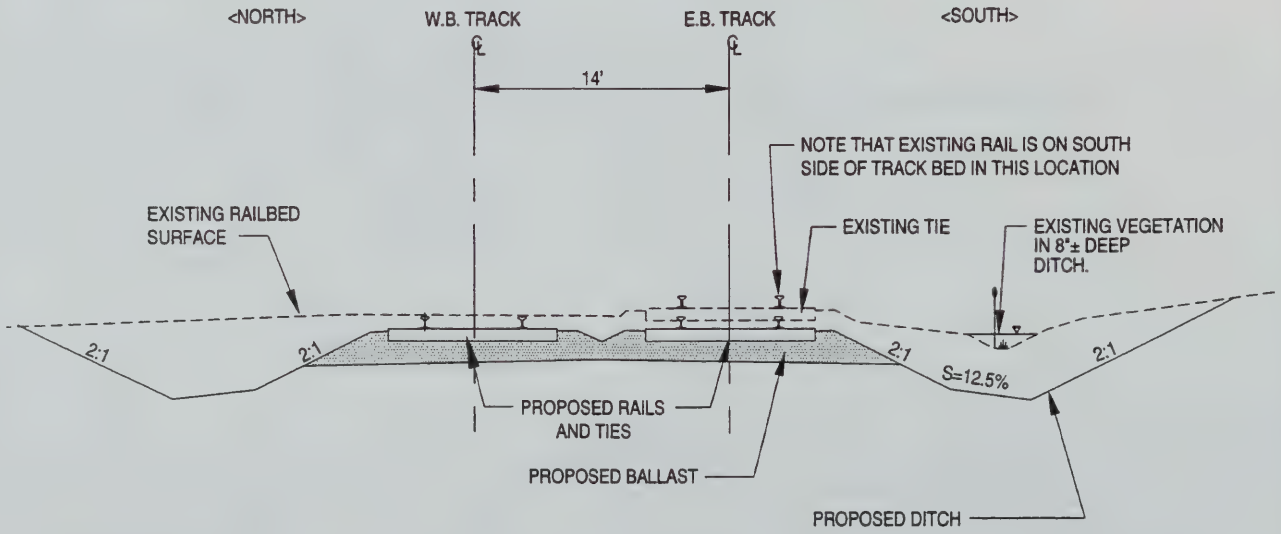
Massachusetts Bay Transportation Authority

CORRIDOR DRAINAGE AND WETLANDS MAP

FIGURE 7.4-2 SHEET 16 OF 16



SECTION THRU CAUSEWAY BY SUASCO RESERVOIR



SECTION NEAR RTE. 140 BRIDGE SHOWING TYPICAL REGRADING / DITCH WORK

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 10'±

0 10

DRAINAGE AND WETLANDS IMPACTS DETAILS

FIGURE 7.4-3

7.5 Wetlands

Overview

The right-of-way for the Boston and Albany Line was constructed in the 1830's and extensive cutting and filling was carried out to minimize any steep gradients associated with the rail line. Wetlands were crossed on filled embankments, and streams were either bridged or carried in a culvert. In some areas the embankment is more than 20 feet high. All of these alterations have been in place for more than 100 years.

The wetland resources in the vicinity of the railroad corridor are associated with three major drainage systems: the Blackstone River, the Assabet River and the Sudbury River. These resources also include the Great Cedar Swamp [an Area of Critical Environmental Concern (ACEC)], habitat for state protected species, the SUASCO Reservoir, ponds, rivers, streams, man-made drainage ditches, associated bordering vegetated wetlands and aquifer protection zones.

This section will discuss potential direct impacts to wetlands resulting from track work, road work, and to some extent, station site development. Direct impacts related to station sites are discussed in the sections that deal with specific stations. Indirect impacts associated with bridge and culvert repairs, vegetation management and railroad operations also are discussed. Potential impacts to water supply resources such as aquifers and watershed protection zones are discussed in specific station site drainage sections.

Between Worcester and North Grafton, the railroad right-of-way lies within the Blackstone River Basin. The dominant natural features include Lake Quinsigamond, Flint Pond, Hovey Pond, Big Bummet Brook and Summet Brook, with their associated bordering vegetated wetlands. Tributary to Lake Quinsigamond are native trout streams and spawning habitat for smelt. Hovey and Flint Ponds are warm water ponds which support common warm water fish species.

Between North Grafton and Westborough, the railroad corridor lies within the Assabet River Basin. The dominant natural feature is the SUASCO Reservoir that was created in the mid 1970's, at the headwaters of the Assabet River. This site is identified as the A1 site in the Corps of Engineers list of dams since it is the first dam site on the Assabet River. SUASCO is an acronym for the Sudbury, Assabet and Concord Rivers. The Sudbury River joins with the Assabet River in Concord to form the Concord River. The Reservoir is a large mouth bass fishery and also is stocked

with Northern Pike and Tiger Muskie. Hocomonco Pond, a SuperFund site, is located north of the railroad in this area and is discussed in detail in Section 14.

A Great Blue Heron rookery, within the SUASCO impoundment, is approximately one quarter mile from the track. The colony has been declining in recent years because the trees that were flooded when the area was impounded are gradually falling, thus reducing the number of nesting sites. The state ornithologist has been studying the colony for years and is of the opinion that current train operations have no adverse impact on the birds and any increase in activity on the rail line will not affect the colony.

Between Westborough and Framingham, the railroad lies within the Sudbury River Basin. The dominant natural features along this area are the Great Cedar Swamp ACEC, which forms the headwaters of the Sudbury River, and the Sudbury River itself, which flows alongside the railroad through Southborough, Ashland and Framingham. The ACEC is discussed in Section 7.6 as it relates to rare and endangered species.

There are several impoundments along the Sudbury River. These are associated with former textile mills or former drinking water supplies. The impoundment adjacent to the proposed station site in Southborough, known locally as Cordaville Mill Pond, supports warm water species and is stocked with trout. The MDC reservoirs in Framingham, no longer used as water supplies, are warm water bass/pickerel ponds.

Wetland Identification

Wetland resources within the project impact area have been identified by a multi tiered identification process. U.S.G.S. topographic maps have been reviewed and field checked. Aerial photogrammetry carried out for the project also has been reviewed for wetland areas and field checked. Various plans on file with local conservation commissions, the Department of Environmental Management, and the Natural Heritage and Endangered Species Program, have provided additional information on wetland areas and rare species habitat. Wetland areas near the proposed Grafton and Westborough stations have been flagged and surveyed. Wetland areas near the Ashland and Millbury station alternatives have been field checked and given approximate boundaries pending a decision on the preferred station location.

The location of wetland resources along the portion of the right-of-way that will be altered to accommodate a second track is shown on a key map, Figure 7.4-1, with accompanying 1" = 200′ scale plans, in Figure 7.4-2, sheets 1-16. The 1" = 200′ scale plan is a composite of the multi-tiered wetland identification process. Wetland

resources along the remaining portion of the right-of-way that is already double-tracked are shown on Figure 7.0-1, Environmental Resources Project Corridor. Wetlands associated with the proposed station sites are shown on figures in the specific station sections of this document.

Wetland Impacts

The second track between MP 33 in Westborough and MP 40 in Worcester was removed a few years ago but the ballast has been maintained and is in excellent condition. A replacement for the removed second mainline track is proposed. Between MP 40 and 44 there is an existing second track that is currently used as a siding. The existing track and railroad ties are in poor condition and will be replaced with continuously welded rail and new wooden ties.

Review of preliminary design plans for the second track along the rail right-of-way, between MP 33 and MP 40, indicates the potential for impacts to wetlands adjacent to the right-of-way. A preliminary assessment has identified wetland areas that would be affected by the slight widening or grading of the embankment that is necessary to accommodate Conrail's requirement for a fourteen foot distance between the centerlines of the two tracks. Although the embankment carried two tracks at one time, the current design criterion for distance between the two tracks requires widening the embankment in some areas.

Potential impacts to specific wetlands along the right-of-way are discussed below. Potential impacts to wetlands at proposed station sites are referenced in this section but discussed in detail in the sections of this document that pertain to specific stations. Wetland impacts for the track work would result from the relocation of drainage ditches, the extension of culverts, and repair or replacement of some bridges and culverts. Wetland impacts related to station sites would result from the construction of access drives, and in the case of the Grafton site, the relocation of Pine Street. Wetland areas that have the potential to be directly affected are identified on Figure 7.4-1, sheets 1-3, with a number designation from 1 to 7. These areas also are identified on the 1" = 200' scale plan, Figure 7.4-2, sheets 1-16.

Wetland Areas 1 & 2

Wetland Areas 1 & 2, found on Figure 7.4-2, Sheet 3, relate to the two alternatives being evaluated for the Millbury Station. Area 1 is the bordering vegetated wetland that is adjacent to the station site north of the tracks. The station site would be in the buffer zone of this wetland, but no wetland impacts are anticipated at Area 1. Area 2 is located south of the tracks. See Sections 12.4 and 12.5 for discussion of impacts.

Wetland Area 3

Wetland Area 3, a drainage ditch in Grafton that extends from the railroad pedestrian underpass near Westborough Road to the Route 140 overpass, is shown on Figure 7.4-2, Sheet 6. It is a narrow, shallow ditch approximately 1,050 feet long that supports wetland vegetation in some sections but is composed mostly of ballast. The ditch is not connected to any stream or other wetland area.

Approximately 3,150 square feet and 1,155 cubic feet volume of Area 3 would be filled for the placement of the second track. The ditch would be replicated at the new toe of slope. (See Figure 7.4-3) Erosion control measures would be implemented during construction.

Preliminary calculations indicate that the area is too small to meet the jurisdictional criteria for Isolated Land Subject to Flooding.

Wetland Areas 4 & 5

Wetland Areas 4 & 5 relate to the road realignment and station site development for the Grafton Station. (See Figure 7.4-2, Sheet 10.) Pine Street and the Pine Street bridge will be realigned to provide better access into the proposed Grafton Station and better sight distance at the intersection of Pine Street with Route 30. Approximately 1,870 square feet of wetlands would be filled by roadway and station site construction. As this work element relates to the Grafton Station site, impacts and proposed mitigation are discussed in Section 13.5.

Wetland Area 6

Wetland Area 6 is the portion of Axtell Brook in Grafton adjacent to the railroad culvert crossing near Pine Street and can be located on Figure 7.4-2, Sheet 10. The channelized brook drains wetland Area 4 and 5, which are discussed previously as the areas pertaining the realignment of Pine Street and the Grafton station site development.

Culvert C-10 at Area 6 may be extended approximately 5 to 10 feet to accommodate the double track. Approximately 50 square feet of stream channel would be altered by the culvert extension. Work in the stream would be done during the dry months. Erosion controls such as temporary check dams would be implemented to protect downstream areas.

Wetland Area 6 meets the jurisdictional criteria of Land Under Water (10.56) and Bank (10.54). The culvert extension will not change the water carrying capacity of the channel or adversely affect water quality or fisheries habitat.

Wetland Area 7

Wetland Area 7 is a drainage ditch in Grafton sparsely vegetated with herbaceous species and approximately 90 feet long and 2 feet wide. It can be located on Figure 7.4-2, Sheet 10. This drain ditch flows into a bowl shaped wooded wetland adjacent to Asylum Road that collects surface flow from the area of the administration building of Tufts University. There is an intermittent stream that flows to a small wetland approximately 400 feet to the east.

Approximately 180 square feet of Area 7 would be filled. The drainage ditch would be replicated at the new toe of slope and function in the same manner as the existing ditch. Erosion control measures would be implemented during construction to isolate the work area and protect the adjacent wetland.

Area 7 meets the jurisdictional criteria of Bordering Vegetated Wetland. The ditch has a distinct linear configuration as defined at 310 CMR 10.55 (4) (c) 2.

Wetland Area 8

Wetland Area 8 in Southborough is within the 100 year flood plain for the Sudbury River and is considered Bordering Land Subject to Flooding. The upland area has been used in the past as a site for storage buildings for the woolen mill that occupied this site. This area is depicted on Figure 15.0-1, in Section 15.0. The area would not be considered significant to the protection of wildlife habitat, because the area has been extensively altered by human activity.

Approximately 9,300 square feet of the area would be filled for the access road to the station parking lot. Compensatory flood storage will be provided and also is shown on Figure 15.0-1.

Wetland Areas 9 and 10

Wetland areas 9 and 10 are located within the easterly and westerly station site alternatives for Ashland. These areas are discussed in Section 16.5 and 16.17 and are shown on the respective site plans in Section 16.0.

Summary - Wetland Impacts

In summary, wetland impacts are associated with the reconstruction of portions of the railroad embankment, the relocation of Pine Street and the construction of access

drives into station sites. The construction of the second mainline track will require the widening or regrading of the existing embankment in some places. Areas where the embankment widening or regrading will require the filling or altering of wetland resources have been identified and evaluated as part of the preliminary design phase and are discussed in this section. Impacts to wetlands related to station access drives are referred to in this section and discussed in the specific station sections of this document. The realignment of Pine Street is also discussed in the Grafton Station section.

Table 7.5-1 presents the total amount of alteration to wetlands resulting from work within the right-of-way as well as other elements of the project. Wetland impact areas are identified in the table using the numerical regulatory references of 310 CMR 10.0, the Wetland Protection Act Regulations.

Indirect Wetland Impacts

Indirect impacts to wetlands might result from bridge repair, culvert repair or replacement, track and signal work within the buffer zone of wetlands, existing vegetation management activities, and routine railroad operations.

Bridge Repair/Reconstruction

The railroad bridge that crosses Route 85 in Southborough will be raised and lengthened. All work will be in upland areas and will not affect wetlands.

The bridge that crosses Hovey Pond, an historic stone arch bridge, could require repairs to maintain structural integrity. The foundation and footprint of the bridge will not be changed and no wetlands will be filled or altered. Silt curtains will be placed around the work area to minimize turbidity and protect water quality.

Culvert Repair or Replacement

Some of the existing culverts may require repair. No change in the size of the culverts is expected and no additional wetland alterations are proposed. The specific culverts to be repaired or replaced will be identified during final design and will be reviewed under the Wetlands Protection Act before construction begins. Measures will be implemented during construction to protect water quality and prevent erosion. The existing culvert crossings within the limits of the proposed second track are shown in Table 7.4-1.

Table 7.5-1 Total Project Wetland Impacts

Wetland Identification #/Town	Figure No. 7.4-2	Type of Wetland (310 CMR Section)	Project Element	Alteration in SF of BVW	Alteration in SF & CF of BLSF	Alteration in SF & CF of ILSF	Alteration in LF of Bank	Alteration in SF of Land Under Waterway
1/Millbury	3	BVW 10.55	Station Site	0				
2/Millbury	3	BVW 10.55; Land Under Waterway 10.56	Station Site	450				150
3/Grafton	3	(Non-Jurisdictional) ILSF 10.57 (1) (b)	Track Work			3,150 sf 1,155 cf		
4/Grafton	6	BVW 10.55	Station Site	370				
5/Grafton	9	BVW 10.55	Road/Bridge Realignment (by MHD)	1,500 (by MHD)				
6/Grafton	10	Bank 10.54; BVW 10.55; Land Under Waterway 10.56	Track Work	200			10	50
7/Grafton	10	BVW 10.55	Track Work	180				
8/Southborough	*	BLSF 10.57 (1) (a)	Station Site		9,300 sf 6,200 cf			
9/Ashland (Easterly Alternative)	**	Land Under Waterway 10.56	Station Site					400
10/Ashland (Westerly Alternative)	**	BVW 10.55	Station Site	***				
TOTALS				**2,700 sf**	**9,300 sf 6,200 cf**	**3,150 sf 1,155 cf**	**10 lf**	**600 sf**

SF = Square Feet and CF = Cubic Feet

* *The Southborough Station Wetland Impact is shown on the Southborough Station Site Plan, Figure 15.0-1*

** *The Ashland Station Wetland Impacts are shown in the Ashland Station Site Plans, Figures 16.0-1 and 16.0-2*

*** *The Ashland Station Westerly Alternative would require filling approximately 2 acres of wetlands. The two acres have not be included in the total of BVW. This alternative will not be considered unless all other sites are determined to be unfeasible. This is discussed in Section 3.0, Ashland Station, Westerly Alternative.*

Track and Signal Work In Buffer Zone of Wetlands

Some of the track and signal work will take place within the 100 foot buffer zone of wetlands. Work that requires any disturbance of soils will be isolated with hay bales or silt fences to control erosion from the site. Work areas will be accessed from the track or existing utility roads parallel to the track. Work within the buffer zone will be reviewed under the Wetlands Protection Act by the local conservation commissions and DEP.

Right-of-Way Vegetation Management Plan

The use of herbicides along railroad, utility, and highway rights-of-way is controlled by the Massachusetts Department of Food and Agriculture (DFA) Rights-of-Way Management Regulations (333 CMR 11.00). The regulations require that a five-year Vegetation Management Plan (VMP) be submitted to the DFA for approval. The VMP is a long term management plan which describes the intended program for vegetation control over a five year period. Once DFA has approved the VMP, a Yearly Operational Plan (YOP) must be submitted to DFA for every year application of herbicides is planned.

Vegetation along the rail right-of-way within the project area is managed by Conrail through the use of herbicides. Portions of the right-of-way are considered No Herbicide Zones or Limited Herbicide Zones because of wetland and water supply sensitive areas. The herbicides used are recommended for use in sensitive areas by DFA. No herbicides are applied within 10 feet of any wetland, water course, or water body. Herbicides are not applied within 400 feet of any municipal water supply well, within 50 feet of any private drinking water wells or within 100 feet of any surface drinking water supply. Certain residential and agricultural areas also have restricted spraying.

Conrail currently has an approved vegetation management plan for the right-of-way pursuant to the DFA regulations. The existing vegetation management program will not be changed or affected by the project.

Railroad Operations

Current operations on the line include Amtrak inter-city and Conrail freight. Potential pollutants associated with rail operations would include hydrocarbons, carbon and metal particulates associated with brake linings, curve lubricators, fuels, and oil. There is no conclusive evidence available regarding the impacts of pollutants from rail beds on water quality and wetlands. The Federal Railroad Administration has not undertaken studies similar to the Federal Highway Administration's report, *Constituents of Highway Runoff.*

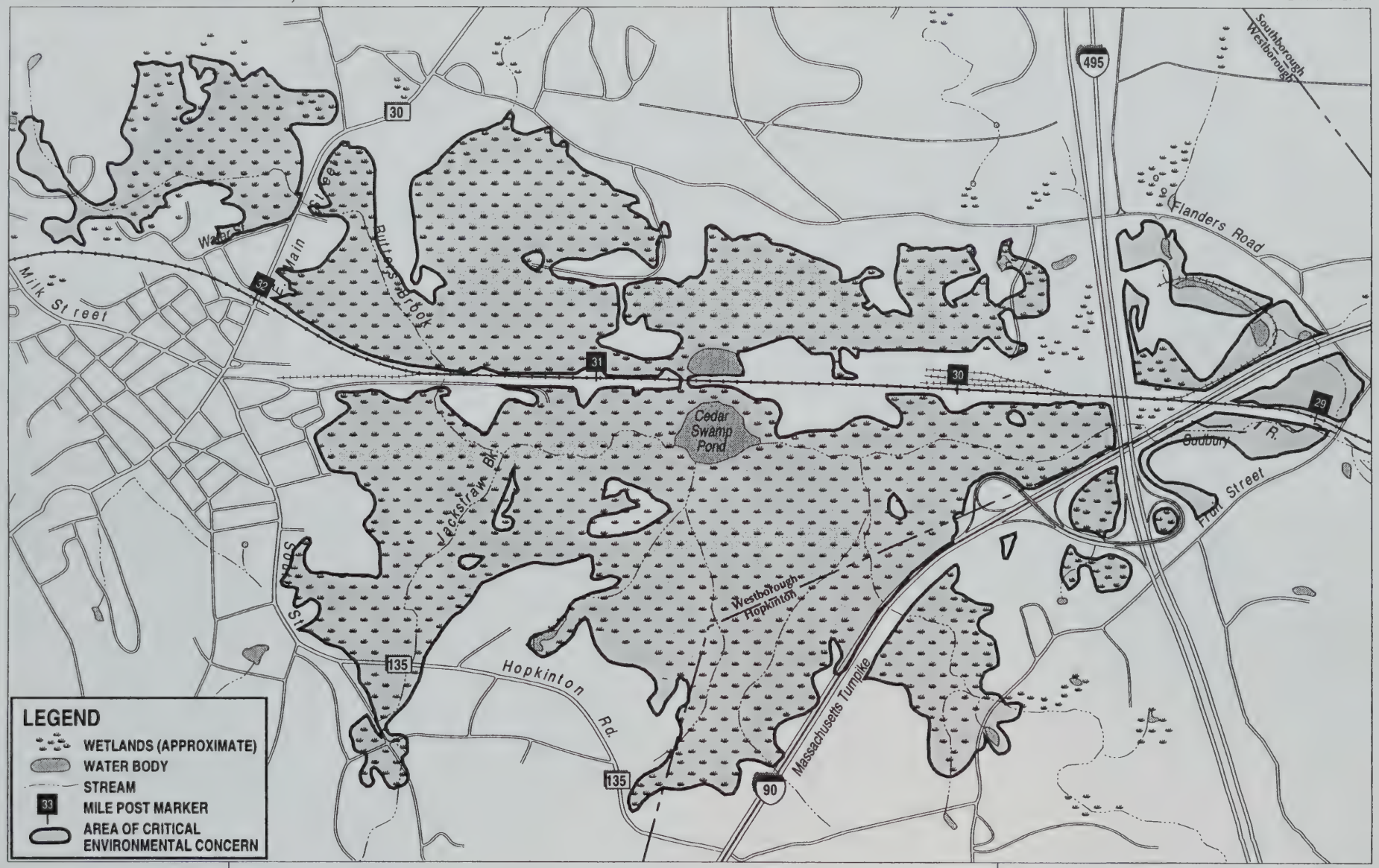
The operation of the extended commuter rail service would add up to 32 new train runs on the rail line. There is currently an average of 12 to 15 freight trains runs a day and 7 scheduled Amtrak runs. Each commuter rail train would consist of one locomotive and a maximum of nine coaches. Freight trains can consist of as many as 80-90 freight cars pulled by two or three locomotives. Amtrak trains are pulled by one engine. As part of the preliminary station site assessments for hazardous materials, some ballast samples were obtained and analyzed. No polychlorinated biphenyls (PCBs) and only low levels of petroleum hydrocarbons (PHCs) were detected in the ballast. These results indicate that existing operations have little effect on rail bed constituents and no material change is to be expected with the proposed commuter rail operations. (See Section 7.10 for additional discussion).

7.6 Rare Species and Ecologically Significant Natural Communities

The Natural Heritage and Endangered Species Program (NHESP) has been contacted regarding rare species and ecologically significant natural communities. Additional information from the pool certification records was obtained regarding vernal pools in the Great Cedar Swamp ACEC. An accurate boundary of the Great Cedar Swamp ACEC was provided by the Department of Environmental Management ACEC Program (See Figure 7.6-1). Rare or endangered fish species information was obtained from the Division of Fisheries and Wildlife in the Department of Fisheries, Wildlife, and Environmental Law Enforcement.

Superimposed on Figure 7.0-1 are the boundaries of estimated habitats of state-listed rare wetland wildlife and high priority sites of rare species habitats and Exemplary Natural Communities taken from the 1994 Atlas of Estimated Habitats. In addition, the presence of other significant natural communities has been noted on Figure 7.4-1.

None of the surface waters adjacent to or traversed by the rail right-of-way are known to have any rare or endangered fish species. The rivers and streams in the area do, however, provide important habitat for trout, smelt, and common warm water species. The upper Sudbury is stocked with trout and supports trout throughout the year. The tributaries to Lake Quinsigamond are also native trout streams and provide spawning habitat for smelt. The potential for adverse impacts to fisheries is related to construction activities that would result in increased turbidity or other water quality impacts resulting from parking lot runoff. Best Management Practices to



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750'

0 1750

WESTBOROUGH CEDAR SWAMP AREA OF CRITICAL ENVIRONMENTAL CONCERN

FIGURE 7.6-1

control construction related erosion will be implemented during all construction activities. Mitigation measures to protect water quality and maintain existing drainage patterns are discussed in detail in the sections that pertain to specific station sites.

Rare species have been recorded in the vicinity of the railroad right-of-way. The Golden-Winged Warbler has been recorded west of the Ashland station sites. The NHESP is of the opinion that the project does not have the potential to adversely affect the Warbler. The Wood Turtle is known to occur in Southborough, north of the proposed station site. The Spotted Turtle is known to occur in several locations in the vicinity of the rail bed, including north of the proposed Southborough Station, in the Cedar Swamp ACEC and other locations in Westborough and in North Grafton. Three certified vernal pools are located in the Cedar Swamp ACEC. Project construction is not expected to affect any of the above species or resources.

7.7 Fencing

Fencing along railroad rights-of-way can provide benefits in terms of safety and security but also creates potential environmental impacts associated with wildlife movements and the visual environment.

Most of the railroad right-of-way between Framingham and Worcester currently is not fenced. Much of this corridor lies within land areas which create a natural barrier between the railroad and adjacent development. These natural barriers include the Sudbury River, extensive wetland areas, floodplain, steep embankments and rock cuts. In areas of higher population and urban land use, there are segments of private fencing. Within the Worcester city limits, much of the right-of-way has been fenced by adjacent property owners. The existing fencing varies in size and type.

Conrail generally minimizes fencing along its rights-of-way in an effort to reduce maintenance requirements. The MBTA's policy, in general, is to locate fence along rail corridors where residential, recreational, or school property is located adjacent to the right-of-way and no natural barriers exist. The rail corridor between Worcester and Framingham was field inspected and areas of concern for safety or security were identified.

Wildlife Movement

Railroads, like other transportation corridors such as highways and rivers, can act as either barriers or conduits for the movement of wildlife.

The railroad corridor the project would use has been part of the environment and in continuous active use for rail transportation for well over 100 years. The construction of the rail bed affected the natural environment by changing drainage patterns, filling wetlands, disrupting ranges of small mammals, and altering or inhibiting migration patterns of large mammals. Various impacts on ranges and food sources would have either eliminated an isolated population or stimulated it to compete and expand into new ranges. Some species such as hawks and deer frequently take advantage of transportation corridors because of the enhanced hunting grounds or easier "trails" and open grazing areas. The clear rail corridor is an attractive grazing area. Although there are seasonal movements of wildlife populations along the Worcester project rail corridor, there are no large herd movements or intense grazing pressures as in the western U.S. or Canada. The deer in the project area are just as likely to graze on suburban homeowner's backyard shrubs as along open transportation corridors during severe winters.

Another type of wildlife/train conflict can occur where hundreds of cars make up a train set and present a slowly moving "fence" which can inhibit movements of animals during certain times of the year. This type of conflict does not occur along the Worcester line because, although long haul freight trains can consist of up to 125 cars, they generally consist of an average of 60 cars. The local freight trains generally consist of between 20 and 30 cars. The commuter trains would not have more than nine cars. Also, there are no large herds of migrating deer along the corridor and the Massachusetts Division of Fish and Wildlife deer biologist is not aware of any conflicts between the train operations and deer along the project corridor.

Continuous fencing along the project rail right-of-way, however, would be a new element of the environment for wildlife within the project corridor and has the potential to affect wildlife movements and wildlife/human interactions. For example, in areas such as the Great Cedar Swamp in Westborough and large undeveloped parcels of land in North Grafton and Southborough, the presence of a fence might inhibit established north-south movements of deer to foraging areas or seasonal ranges. The presence of a fence also might serve as a conduit to funnel large animals such as deer or moose toward rail/highway intersections or population centers. Conversations with the state deer biologist indicate that moose sometimes migrate south from New Hampshire during the hunting season. Because of the potential of fencing to affect wildlife, no fencing is proposed along the right-of-way within the boundaries of areas such as the Great Cedar Swamp ACEC and other large

undeveloped tracts of land. Within the ACEC existing fencing at the Conrail Auto Terminal and Cumberland Farms site will remain but will not be extended as part of this project. Other sections of right-of-way that border residential or recreation areas have been evaluated on a case by case basis and are discussed below. This discussion and evaluation of fencing for the project was developed from information gathered from *Landscape Ecology* by R. Formen, consultations with the state deer biologist, and *Ungulate/Train Collisions* by M. Magner.

The potential locations of noise barrier walls are discussed in Section 7.3. These structures would be in residential areas and are not expected to have significant impacts on wildlife.

Safety and Security

New fencing has been proposed for safety reasons at several locations along the right-of-way, as shown in Table 7.7-1. The locations are identified by milepost marker and the approximate length of fencing is given for each site. (Mileposts are shown on Figure 3.1-1).

Where residential, recreational, or school property is located next to the right-of-way, six foot chain link fencing is proposed. Fencing has also been proposed where it is perceived that the proximity of the land uses adjacent to the right-of-way may create a safety hazard. All fencing associated with the proposed project along the right-of-way and at the stations would be located on property owned and maintained by the MBTA or Conrail. A decision on the location and type of fencing would be coordinated with town officials during final design.

The standard 6-foot high chain link fence would be utilized at most of the fence sites along the right-of-way. High security fencing (a 6 foot high chain link fence with a three strand barbed wire top) would be considered for areas that warrant its use, such as at the Layover Facility. Discussion of fencing details for the stations and layover facility is included in the sections of this document that relate to those elements of the project.

Table 7.7-1 Railroad Corridor Sideline Fencing

General Location		Approx. Mile Post	Approximate Length of Fence	
Town	Street		Existing	Proposed
Framingham	Winter Street	22.3	320′ LT*	1300′ LT
	Winter Street	22.3		350′ RT
Ashland	Fountain to Homer Avenue	23.8	1850′ LT	
	Front Street	24.1	1000′ RT	
	Homer Avenue	24.2	210′ LT	
	Main to Cherry Street	24.4	630′ LT	580′ RT
	Forest to Metclaf	24.6	530′ RT	640′ RT
	Megunko Road	24.6	260′ LT	250′ LT
	Megunko Road	24.6	160′ LT	250′ LT
	Nyanza	24.8	1270′ LT	
	Ballfields	25.3	740′ RT	
	Olsen Medical	25.9	950′ RT	
Southborough	Southville Road	27.1		930′ RT
	Bridge Street	28.0		1400′ RT
	Bridge Street	28.0		400′ LT
	Town Line	28.3	530′ RT	200′ RT
Westborough	Old Flanders Road	28.8	370′ RT	
	I-495 to Conrail Yard	29.9	3800′ RT	
	East Main Street	31.9	1160′ LT	300′ RT
	High Street	32.2		300′ LT & RT
Grafton	JobCorps	36.2	2100′ RT	
	Parmenter	37.1		500′ LT
	Shrewsbury Road	37.9	1200′ RT	500′ LT
Worcester	Hamilton Street	41.7		600′ LT & RT
	North High School	42.1	1500′ LT	
	Eastview to Plantation	42.5	2400′ RT	
	Plantation Street	42.7	3000′ LT	
TOTAL FENCE LENGTHS			10,360′ LT 13,620′ RT	4,100′ LT 5,300′ RT

LT = southerly tracks; RT = northerly tracks

7.8 Cultural Resources

Historic Properties/Sites

In accordance with the EOEA certificate for this project, an architectural survey was conducted along the right-of-way. This survey identified properties for which architectural survey forms will be completed. The survey located existing National Register properties in relationship to the proposed project. Properties to be surveyed were grouped according to their proximity to the right-of-way and to proposed station locations. While most of the buildings associated with the project can be grouped with station locations, there is a number of buildings located between stations. In particular, along the right-of-way between the stations, there are 26 bridges for which structure-inventory forms will be completed. Eleven of the bridges are highway bridges and 15 are railroad bridges.

The architectural survey was based upon a right-of-way of 100 feet, i.e. 50 feet from the center line of the existing tracks. This is between 20 and 60 feet wider than the existing right-of-way. This area is extended to properties surrounding proposed station locations. For the most part, these boundaries result in a survey area that is "one property deep." Many of the structures 50 years old and older were built after the original tracks were laid during 1834 and 1835. Although commuter rail was discontinued on this line in 1975, the rail line has seen continuously active traffic since its inception in 1835. Although all structures will be evaluated for visual and construction impact, it is not anticipated that there will be significant impacts because the majority of structures were built after the rail line was constructed and this is an active rail line.

Impacts on structures along the right-of-way are expected primarily to be visual, with little actual physical disturbance to existing historic properties. Impacts to structures at the proposed new station sites will be visual through a change of setting. Again, there will be little actual physical disturbance to existing historic properties.

Those buildings and structures adjacent to the project right-of-way which may be affected by the proposed project are listed in Table 7.8-1. The architectural survey forms will be completed and will be reviewed by the Massachusetts Historical Commission before the project's FEIR is submitted for MEPA review.

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
		FRAMINGHAM			
1	17 Concord Street	Empty store		?	Visual
2	15 Concord Street	Daisy's Consignment Store		?	Visual
3	407 Waverly Street	Coffee Unlimited		?	Visual
4	20 Concord Street	New England's Largest Fabric Store		?	Visual
5	417 Waverly Street	Original Richardson train station (1884-5)	NR Form B	Yes	Visual
6	59 Fountain Street	Bancroft Building; 1895-1915 mill building, probably largest surviving of this period; Framingham Shoe Company located here in 1915	Form B	Yes	Visual
7	F-7-16 Fountain Street	Highway bridge; very common design, 20th century plate girder	BIF	No	Visual
8	635 Waverly Street	Cadillac Long		?	Visual
9	156 Fountain Street	Lloyd's Diner		?	Visual
10	Behind 899 Waverly Street	J. Noblini Roofing Co.; two-story; brick in back, front first floor is cement block, front second floor is wood		?	Visual
11	Behind 885 Waverly Street	Gossamer Rubber Co.; oldest Gossamer Co. in country; began in South Framingham in 1875, moved to this location in 1877, completed 1881	Form B	Yes	Visual
12	861 Waverly Street	Specialty Converter, Inc.; factory		?	Visual
13	Winter Street	Highway bridge		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
14	971 Waverly Street	Reverend Charles Train's house; Federal Period (altered); built between 1810-1829	Form B	Yes	Visual
15	997 Waverly Street	White house; two-story with side dormers		?	Visual
16	1007 Waverly Street	Three-story house; open porch in front		?	Visual
17	1015 Waverly Street	Three-story house; enclosed porch in front		?	Visual
18	1035 Waverly Street	Three-story house; open porch, two-story high columns in front		?	Visual
19	1045 Waverly Street	L-shape house; three-story, open porch		?	Visual
20	1051 Waverly Street	White house; two-story, gambrel		?	Visual
		ASHLAND			
21	18 Waverly Street	Beckongreen Ltd. Garden Center		?	Visual
22	MDC Reservoir #2	Railroad Arch Bridge		?	Visual
23	Fountain Street	Converted barn (center hall Colonial)		?	Visual
24	Fountain Street	1893 B&A Railroad bridge #23-67; double intersection Warren pony trusses	BIF	no	Visual
25	50 Homer Street	Ashland Technology Center		?	Visual
26	Richard D. Murphy Square	Office Rohit Jangi, MD, internal medicine. Old B&A train station (Richardson, 1879)	Form B	Yes	Visual
27	179 Main Street	Ashland Hotel (1834)	LHD; Form B	yes	Visual
28	159 Main Street	Ashland News Store (1841)	LHD; Form B	yes	Visual
29	Cherry Street	Water and Sewer Department garages		?	Visual
30	55 Tilton Street	Old shop; cement foundation, one-story		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
31	Pleasant Street between Tilton and Forest (by railroad)	Wooden factory; back portion of large modern brick and blue metal siding factory, named WH		?	Visual (Alternative C)
32	12 Metcalf Street	Old trailers		?	Visual (Alternatives B, C)
33	15 Metcalf Street	End of street; brick foundation		?	Visual (Alternatives B, C)
35	179 Pleasant Street	White house; gambrel with enclosed porch		?	Visual (Alternative B)
36	191 Pleasant Street	House; duplex porch		?	Visual (Alternative B)
37	197 Pleasant Street	White house; gambrel with open porch		?	Visual (Alternative B)
38	203 Pleasant Street	House; enclosed porch		?	Visual (Alternatives A, B)
39	211 Pleasant Street	House; gambrel		?	Visual (Alternatives A, B)
40	217 Pleasant Street	House; gambrel		?	Visual (Alternatives A, B)
41	225 Pleasant Street	House; gambrel		?	Visual (Alternatives A, B)
42	237 Pleasant Street	House; enclosed porch		?	Visual (Alternatives A, B)
43	243 Pleasant Street	House; gambrel		?	Visual (Alternatives A, B)
44	251 Pleasant Street	House; gambrel with dormers and enclosed porch		?	Visual (Alternatives A, B)
45	259 Pleasant Street	White house; front gable		?	Visual (Alternatives A, B)
46	265 Pleasant Street	House; gambrel		?	Visual (Alternatives A, B)
47	273 Pleasant Street	House; gambrel, open porch, columns		?	Visual (Alternatives A, B)
48	281 Pleasant Street	Cream house; brick chimney		?	Visual (Alternatives A, B)

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
49	289? Pleasant Street (next to 285)	VFW Hall, Post 2331		?	Visual (Alternative A)
50	285 Pleasant Street	White house; one-story		?	Visual (Alternatives A, B)
51	Pleasant Street	Latter Rain Christian Fellowship (former Saving Spring Co.)		?	Visual (Alternatives A, B)
52	330 Pleasant Street	One-story white house, 1940s; gables		?	Visual (Alternatives A, D)
53	360 Pleasant Street (Plaza)	19th century; redone Tudor complex		?	Visual (Alternatives A, D) and possible direct impact with Site Plan D (October 1993)
54	Corner of High and Pleasant streets	Burnam's Supperhouse; white, three story		?	Visual and possible direct impact with Site Plan D (October 1993)
55	High Street Bridge (highway over RR)	1890 bridge over B&A Railroad (# 25-25); riveted double intersection Warren pony trusses	BIF	yes	Visual (Alternative D)
		SOUTHBOROUGH			
56	94 Southville Road	Brown house; two-story		?	Visual
57	90 Southville Road	"Mamma Rosas" pizza and sub shop		?	Visual
58	100 Southville Road	Yellow; three-story, enclosed porch in rear		?	Visual
59	98 Southville Road	Brown house; three-story		?	Visual
60	Rte. 85 (Cordaville Road)	Railroad bridge; being rebuilt		?	Direct (Draft EIR)

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
61		Railroad bridge		?	Direct (Draft EIR)
62	81 Southville Road	Three-story home; green shutters		?	Visual
63	110 Southville Road	FitzGerald's General Store	Form A; Form B	Yes	Visual and possible direct (Site Plan, Draft EIR)
64	3 Cottage Street	Tan house; two-story, with columns	Form A	Yes	Visual
65	5 Cottage Street	Yellow house; two-story, with dormers and protruding front bay windows	Form A	Yes	Visual
66	7 Cottage Street	White house; two-story with protruding front bay windows	Form A	Yes	Visual
67	9 Cottage Street	White house; two-story	Form A	Yes	Visual
68	8 Parker Street	Blue house, pre-1870; three-story	Form A; Form B	Yes	Visual
69	3 Highland Street	Olive house, pre-1870; two-story, L-shape	Form A; Form B	Yes	Visual
70	95 Southville Road	White house, pre-1870; three-story, no shutters	Form A	Yes	Visual
71	Southville Road (at intersection with Rte. 85 - Cordaville Road)	Ipnema Restaurant; white, one-story		?	Visual
72	114 Southville Road	Boarding house; three-story with purple trim		?	Visual
73	Southville Road	Next to boarding house; front gable		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
74	South of Southville Road, on tracks	Subway passage		?	Direct (Site Plan, Draft EIR)
75	156 Southville Road	White house, pre-1870; two-story	Form A; Form B	Yes	Visual
76	160 Southville Road	Grey house; two story, lean-to	Form A	Yes	Visual
77	163 Southville Road	White house; two-story with enclosed porch	Form A	Yes	Visual
78	166 Southville Road	Two-story house	Form A	Yes	visual
79	Bridge Street S-20-14	Bridge; 1901 single intersection with Warren pony truss; unaltered, both types of sway bracing systems in a single bridge	BIF	Yes	Visual, possible direct
80	2 Valade Ct.	White house, pre-1870; two-story, fieldstone foundation with enclosed porch	Form B	Yes	Visual
81	3 Valade Ct.	White house; enclosed porch		?	Visual
		WESTBOROUGH			
82	10 Old Flanders Road	Leonard/Prentiss House, ca. 1800 (with additions); within proposed Rocklawn District	Form B; LHD	Yes	Visual
83	Fruit Street	Bridge		?	Visual
84	6 Wood Street	Brown shingle house; three-story		?	Visual
85	Rte. 90/ Railroad intersection	Bridge; east of building 86		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
86	Railroad/Rte. 495 intersection	Bridge over Rte. 495		?	Visual
87	Brigham Street (extension)	Factory; one-story, L-shape		?	Visual
88	Brigham Street (extension)	Factory; large one-story, with shipping docks		?	Visual
89	Main Street	Bridge		?	Visual
90	35 East Main Street	Boston Trader Footwear Outlet; one-story, brick		?	Visual
91	Union Street	1899 train station (Richardson)	Form B	Yes	Visual
92	Union Street	Bay State Abrasive Factory		?	Visual
93	20 Willow Street	One-and-a-half-story cape house; exterior chimney		?	Visual
94	Water Street and High Street	Bridge		?	Visual
95	38 Water Street	Two-story house		?	Visual
96	43 Water Street	Two-story house; L-shape, open porch, dormers		?	Visual
97	35 Water Street	Brown house at intersection of bridge		?	Visual
98	Holmes Street	Front gable cottage; two-story		?	Visual
99	11 State Street	White house; two-story, open porch		?	Visual
100	13 State Street	Two-story house; front gable		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
101	15 State Street	Two-story mansard; enclosed porch		?	Visual
102	27 High Street extension	Two-story house; open porch, shingle		?	Visual
103	46 High Street extension	Two-story mansard		?	Visual
104	Across from 108 Milk Street	Corrugated Paper Corporation		?	Visual
105	Milk Street	Bridge		?	Visual
106	Maynard Street	Railroad bridge		?	Visual
107	37 Maynard Street	L-shape house; one-story	Form B	Yes	Visual
108	65 Fisher Street	Carlstrom Pressed Metal Co. factory; concrete block, L-shape, one-story		?	Visual
109	Otis Street W-24-9	Bridge; 1914 steel stringer, very common design	BIF	No	Visual
110	85 Fisher Street	Two-story house; with sunburst, one window dormer		?	Visual
111	92 Fisher Street	Two-story cottage		?	Visual
112	87 Fisher Street	One-story house		?	Visual
113	89 Fisher Street	Two-story house		?	Visual
114	94 Fisher Street	Two-story; redone		?	Visual
115	91 Fisher Street	White house; one-story, aluminum blinds		?	Visual
116	95 Fisher Street	White house; one-story		?	Visual
117	98 Fisher Street	Cape house; two-story		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
118	97 Fisher Street	Cape house; two-story		?	Visual
119	99 Fisher Street	1727 house; station site	Form B	Yes	Visual
120	Fisher Street over Penn Central Railroad W-24-10	Bridge, 1894 iron; moved and rebuilt 1915-1916	BIF	No	Visual
121	Smith Valve Parkway	Winter Hill factory; large one-story, white cement block material		?	Visual
122	Arch Street	Railroad bridge		?	Visual
		GRAFTON			
123	Pine Street G-8-14	1916 Bridge; I-beam stringer bridge; altered and deteriorated example of common bridge; former B&A Main Line; within Area BR	BIF	No	Direct, to be rebuilt
124	Pine Street Grafton State Hospital/Grafton Job Corp Center G-8-13	Asylum Road over Conrail; 1906 steel five-panel pratt pony truss; late example of a once common bridge type; somewhat altered	BIF	No	Visual, possibly direct
125	Pine Street Grafton State Hospital/Grafton Job Corp Center	"Bldg. #7, Laundry/Powerplant" - 1904; brick with stone foundation; two-story with extension and chimney	Form A	Yes	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
126	Pine Street Grafton State Hospital/Grafton Job Corp Center	1909 brick building; three-story with mansard roof	Form A	Yes	Visual
127	Pine Street Grafton State Hospital/Grafton Job Corp Center	"Carpentry Shop" - 1926; 2 story, wood with stone foundation, mansard, dormers; now "Home Builders Institute"	Form A	Yes	Visual
128	168 Westborough Road/ Within Tufts boundary	White house, early to mid 19th century; small, two-story	Form B	Yes	Visual
129	138 Westborough Road	Two-story house, ca. 1830s-1840s; with dormer	Form B	Yes	Visual
130	109 Westborough Road	Cottage with bay windows; exterior chimney		?	Visual
131	109 Westborough Road	Low one-story; parallel to road		?	Visual
132	(off of Westborough Road)	Parmenter Crossing Bridge		?	Direct
133	73 Westborough Road	Two-and-a-half-story house; cross gambreled on rubble foundation, with Tuscon columned porch; 1910	Form B	Yes	Visual
134	71 Westborough Road	Cape house		?	Visual
135	Near Nelson Street	Subway		?	Visual
136	B-39 Westborough Road	L-shape		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
137	11 Westborough Road	White house, two-and-a-half-story with black shutters, bay window on side of building; 1885, Italianate/Queen Anne vernacular	Phase 1 Town Survey List	Yes	Visual
138	9 Westborough Road	White house, two-story; front gable porch		?	Visual
139	5 Westborough Road	Yellow house, three-story; bay window, open porch on side; late 19th century, Greco-Italianate	Phase 1 Town Survey List	Yes	Visual
140	22 Shrewsbury Road (intersection with Westborough Rd)	One-story cement block (currently a barber shop)		?	Visual
141	Shrewsbury Road	Highway bridge		?	Visual
142	Hovey Pond Railroad bridge	Bridge		?	Visual
143	Across tracks from 109 Creeper Hill Road	Wyman-Gordon factory		?	Visual
144	109 Creeper Hill Road	Concrete Precasters Corporation		?	Visual
WORCESTER					
145	1451 Grafton Street (Rte. 122)	Standard Lock Washer and Mfg. Co.; one-story brick		?	Visual
146	Rte. 20	1930s bridge; concrete		?	Visual
147	34 Nathaniel Street	Large dormer		?	Visual
148	Sunderland Road	Bridge; concrete		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
149	Lake Avenue (between 444 and 446)	Garage		?	Visual
150	Lake Avenue (between 444 and 446)	Garage		?	Visual
151	Quinsigamond State Park, on both sides of Lake Avenue	Park recreation area		?	Visual
152	Hamilton Street W-44-31	1931 bridge; steel stringer encased in concrete; late example of this type of bridge	BIF	No	Visual
153	end of Carver Street	Deep cut, retaining wall		?	Visual
154	Plantation Street	Bridge; deep cut, brownstone stone walls		?	Visual
155	10 Hecla Street	Front with enclosed porch		?	Visual
156	Shrewsbury Street factory area	General Screw Machine Products		?	Visual
157	Parallel to Shrewsbury Street	Signal tower		?	Visual, possible direct
158	E. Worcester St/ Nebraska Street	Factory; aluminum		?	Visual
159	Parallel to Shrewsbury Street	Small railroad building by signal tower		?	Visual, possible direct
160	Nebraska Street 1 Envelope Terrace	Speirs Mfg. Co. factory; "Sheppard Envelope Co."; three-story brick factory	Form B	Yes	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
161	14 E. Worcester Street (closest to S. Hill Street)	"Central Supply"; three-story brick, L-shape		?	Visual
162	E. Worcester Street (west of S. Hill Street)	"Maintenance Department - Worcester Public Schools"; three-story brick, rectangular		?	Visual
163	18 E. Worcester Street (closest cross road is S. Hill Street)	"City of Worcester DPW"; four-story brick		?	Visual
164	16 E. Worcester Street (closest cross road is S. Hill Street)	"City of Worcester DPW"; three-story brick		?	Visual
165	E. Worcester Street (in between S. Hill and Larkin Streets)	White painted brick building; three-story; faded painting says "United Dairy Systems"		?	Visual
166	E. Worcester Street	"Sewer Department"; yellow painted brick, three-story		?	Visual
167	Putnam Lane	Bridge		?	Visual
168	Putnam Lane	Abandoned factory		?	Visual
169	Grafton Street	Bridge		?	Visual
170	Harding Street	Bridge		?	Visual
171	Harding Street (south of 51 Harding)	Beacon Sales Co.: brick, one-story		?	Visual
172	Franklin Street/Harding Street	Worcester Gear Works, Inc.		?	Visual

Table 7.8-1 Historic Properties/Sites

Building Survey No.	Location	Description	*NR; LHD; BIF; Form A; Form B	Potential Eligibility	Effect
173	Temple/Ernest bridge	1912		?	Visual
174	Temple Street	Bridge; marked 1912		?	Visual
175	20 Temple Street	James Cowan and Sons, Inc.: Meats, Provisions; one-story brick		?	Visual
176	51 Harding Street	M. Goldstein Scrap Metal; three-story, brick factory		?	Visual
177	Harding Street (south of 51 Harding and Survey building #171)	Heywood Building "Heywood Trademark Shoe 1864"; four-story brick factory	NR; LHD	Yes	Visual
178	Washington Square	Union Station 1909-1911; three-story white terracotta; deteriorated	Form B	Yes	Visual

* *NR - National Register*
LHD - Local Historic District
BIF - Bridge Inventory Form
Form A - Area Form
Form B - Building Form

Archaeological Resources

For the DEIR process, the MBTA has undertaken a reconnaissance archaeological and cultural resources survey over the entire length of the project corridor. The Massachusetts Historical Commission reviewed and approved the scope of work for the archaeological reconnaissance survey, and the State Archaeologist issued a permit to conduct the archaeological field investigation on April 22, 1993. The archaeological reconnaissance survey was completed in June, 1993. The reconnaissance survey had two main goals, to identify archaeological resources exposed on the surface of the rail corridor, and to model the probability that subsurface archaeological resources exist in the corridor.

The reconnaissance identified several archaeological resources along the project corridor. One of these resources is a prehistoric site that is eroding from the top of a cut through a knoll in Cedar Swamp in Westborough. This location corresponds to a prehistoric site previously documented as part of the Cedar Swamp Archaeological District which is listed in the National Register of Historic Places. Unless addressed, continuing erosion may lead to eventual loss of the site. In addition to this site, the reconnaissance also identified several nineteenth-century cultural resources along the rail corridor. Two of these resources are mill sites on the Sudbury River. One mill lies in eastern Westborough, in the location of a grist and sawmill complex that existed by 1837; the other mill is on the Southborough-Ashland town line, in the location of the Aldrich woolen mill of the 1870s. While project impacts will avoid the Westborough mill entirely, the Aldrich mill extends to the edge of the existing railroad bed, and may be impacted by project construction.

The modeling of potential archaeological sites focused on prehistoric cultural resources. The reconnaissance survey involved systematically recording the conditions of slope, soil drainage, distance from water and existing disturbance throughout the corridor (reference Appendix - Volume II, Section 4.0). The sensitivity model ranks individual sections of the project corridor according to these four factors, and then assigns an overall ranking of high, moderate, or low archaeological potential to each corridor section.

An intensive archaeological study based on the findings of the archaeological technical report is planned as a component of the preparation of the FEIR. This survey will include additional, more detailed background research plus subsurface examination of those areas anticipated to contain potentially significant archaeological resources.

7.9 Visual Impacts

The rail corridor traverses a variety of urban, suburban, and undeveloped rural terrain. Many of the abutting land uses are industrial activities currently or formerly dependent on rail access. In undeveloped areas, wayside vegetation would restrict views from the train. In limited areas, where the corridor abuts or traverses bodies of water, there will be brief opportunities for scenic vistas.

Since the rail corridor is long established and recent activity is predominantly freight trains, the addition of commuter rail trains is not anticipated to have any significant impact on the visual aspect of the corridor for abutters. (See Section 7.8, preceding, for discussion of potential visual effects on historic properties).

7.10 Hazardous Materials

Typical rail bed contaminants include lubricating oils, diesel fuel, and particulates of carbon, metals, and brake linings. In conjunction with environmental site evaluations of proposed station sites, ballast samples from the mainline tracks were collected for chemical analyses. A total of eight samples were collected at a depth of between 6 inches and 12 inches, using a stainless steel spade. Samples were stored in glass jars for transfer to the laboratory for analysis.

The ballast samples, obtained at sites in Ashland, Southborough, Westborough, and Grafton, were collected at locations along the mainline that are representative of running track, rather than locations such as rail yards where trains may remain stationary for long periods of time. Thus, the results of the analyses can be considered representative of probable conditions along the entire corridor.

Chemical analyses were made to test for the presence of polychlorinated biphenyls (PCBs) using EPA Method 8080 and petroleum hydrocarbons (PHCs) using EPA Modified Method 418.1.

None of the analyses detected the presence of any PCBs. Analysis of the ballast sample from Ashland detected a concentration of 29 parts per million (ppm) of PHCs, which was determined to be lubricating oil. Analysis of the ballast sample from Grafton detected a concentration of 13 ppm of PHCs. In both instances, the detected level is below the draft reportable concentration criterion of 200 ppm for petroleum hydrocarbons. No trace of PHCs was detected in the remaining ballast samples.

The rail corridor has been in continuous use since 1835, with historical daily train activity far in excess of current or proposed future operations. The results of the analysis of collected ballast samples indicate little or no contamination from PHCs. The additional activity resulting from restoration of commuter rail service is not anticipated to result in any significant increase in concentrations of petroleum hydrocarbons along the rail corridor.

7.11 Pedestrian Safety

As described elsewhere under the sections on commuter rail stations, pedestrian crossing of the tracks will be discouraged by construction of intertrack fencing through each station site, and by construction of pedestrian bridges over the tracks to connect station platforms to the parking facilities.

The three grade crossings of the railroad have existing crossing protection as described in Section 7.1. Where deemed necessary for safety and security, fencing will be constructed on the railroad right-of-way perimeter to restrict access, as described in Section 7.7.

7.12 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation, and safety concerns.

The construction activity along the rail corridor involves track refurbishing, rehabilitation and restoration. The upgrading of existing tracks to operational standards required for commuter rail will typically involve highly specialized equipment that travels on the rails. Tie replacement, re-ballasting and adjustment of rails would result in temporary increases in noise levels from the equipment engines as well as from the work activity.

Over the seven mile segment where the second track must be installed, construction activity will include excavation and grading, which can result in fugitive dust and erosion in addition to increased noise levels.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of applicable orders-of-conditions issued by local conservation commissions will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise impacts and possible mitigation are described in the preceding Section 7.3.

7.13 Proposed Mitigation and Mitigation Options

Rail bed improvements are being designed to minimize potential adverse effects on resource areas. Any work affecting resource areas or within the buffer zone will be reviewed by local conservation commissions and construction will be performed in compliance with any order-of-conditions that may apply.

Basic commuter rail service is projected to result in noise impact to 6 residences in Grafton. Expanded service, with a greater number of trains per day, is projected to result in noise impact at 92 residences along the corridor. The total length of noise barrier required to mitigate noise impact is estimated to be 1,200 linear feet for basic service and 16,950 linear feet for expanded service at estimated costs of $384,000 and $5,424,000, respectively.

As described in the section on noise impacts, mitigation can involve source noise control, path noise control or receiver noise control. The most beneficial course of action for rail noise may be path noise control, since that would mitigate noise from all trains on the corridor, not just those under MBTA jurisdiction. Receiver noise control through physical changes to residential structures may not be acceptable to occupants, and does not address outdoor noise level impacts.

The barrier length estimates are, at this stage, preliminary. Detailed barrier designs will be developed during the final design stage of the project, and the barriers will be constructed only if they are found to be effective, feasible, and acceptable to the communities. Some of the factors to be addressed are the structural, aesthetic, and acoustical feasibility of the barriers, as well as their cost effectiveness with respect to acoustical benefits. For example, a barrier that protects only one or two homes is less likely to be constructed than one that protects a large number of homes.

Either basic or expanded commuter rail service is projected to result in vibration impact at 41 residences along the corridor. Mitigation options include source control, path control or receiver control. The most beneficial course of action may be path vibration control through installation of ballast mats. Based on the projected impact, ballast mat mitigation is estimated to cost $1,700,000.

Ballast mat locations, lengths, and widths developed in this study are preliminary. Site-specific investigations will be required during the final design phase of the project to determine where the use of ballast mats is effective and feasible. Some of the factors that must be addressed at that point are the frequency content of the ground-borne vibration at specific locations, which affects the performance of this treatment, as well as cost effectiveness.

With regard to feasibility, ballast mats may not be able to provide sufficient vibration reduction at locations where the ground-borne train vibration is dominated by very low-frequency components. Furthermore, ballast mats may not be cost effective in areas where there is a small number of homes to be protected. During final design it also will be necessary to determine these factors, as well as specify the ballast mat material and installation procedure to ensure adequate train vibration control.

To minimize construction noise impact, the following mitigation measures will be incorporated in project specifications where appropriate:

- Using the quietest equipment possible, e.g., by ensuring that all diesel-powered construction equipment has effective mufflers and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

Recently adopted MBTA policy provides for the expenditure of up to 2% of the project construction cost for noise and vibration impact mitigation. Consideration of the cost effectiveness of any noise mitigation measures must be weighted against the actual relief provided.

SECTION 8.0 ALTERNATIVE LAYOVER FACILITY SITES

Passenger train layover facilities typically are provided at the outer terminus of a commuter rail line to eliminate "deadhead" movements, that is, non revenue, non passenger-carrying runs back to a central storage facility at night and out to the end of the line in the early morning. This section provides a discussion of layover site criteria and the process of alternative site identification and evaluation employed in selection of the preferred layover site facility in Worcester.

In addition to providing secure overnight storage of the train sets, a layover facility must provide an electric power source to maintain heat for the locomotive engine while it is shut down. Minimal servicing is performed at layover sites, and is generally limited to topping off locomotive cooling systems, adding lubricating oil, inspection, and cleaning of the train set.

8.1 Layover Site Selection Criteria

The MBTA's "General Guideline for the Design of Passenger Train Layover Facilities" outlines basic elements to be considered in the siting of a layover facility:

- The facility should be located near the last station on the line, to minimize deadhead movements;
- The facility should be located off to one side of the existing main track (if the main track continues beyond the site) and be generally parallel to the main track;
- The length and number of tracks should be adequate to accommodate four, nine car train sets;
- The track layout preferably will be double ended so that trains can access the main tracks from either end of the layover facility. This design element provides operational flexibility in the event of breakdown or derailment;

- The centerline to centerline distance between a main track and nearest track in the layover facility should be at least 27 feet;
- The site layout should allow for a vehicular access road between tracks for service vehicles; and
- The site should be large enough to accommodate employee parking, a maintenance office/storage building, and an electric power substation.

8.2 Site Identification and Evaluation

A layover facility that provides the desired track geometrics and site amenities requires approximately 6½ acres of land. The rail corridor was inventoried using available maps, track charts and local knowledge to seek potential locations for the proposed Worcester Commuter rail extension layover facility.

The basic criteria used for site selection were size and location. A parcel of land had to be large enough to accommodate a layover facility and be located adjacent to or be accessible from the mainline tracks.

The investigations identified thirteen possible sites for a layover facility. Of these, ten are located along the Conrail right-of-way between Framingham and Worcester, and three are located along the Providence and Worcester right-of-way in Worcester. Each site was investigated in the field to aid in evaluation of advantages or disadvantages of that particular location.

Site 1 - Conrail's Neven Yard, Framingham, MP 22.1

This site is located on the north side of the mainline in Framingham, between the Fountain Street bridge and the Winter Street bridge.

Site 1 has sufficient land area for a full facility with all amenities, and has good track and road access. It is likely that use of this site would have little or no potential negative effects, since it currently is an active rail yard. However, it is unlikely that Conrail would be willing to give up use of the facility for freight service. Additionally, this location is 22 miles from Worcester, resulting in considerable dead-head travel.

Site 2 - Westborough Auto Yard, MP 30.5

This site is located just west of the existing Conrail auto distribution yards in Westborough, on the north side of the right-of-way, about 0.8 miles west of Route I-495.

Site 2 has sufficient land area for a full facility with all amenities, has good track access, and road access could be provided through the existing rail yard just east of this site. The major disadvantage to this site is its location within the Great Cedar Swamp, which is an Area of Critical Environmental Concern (ACEC). Construction costs would be high due to the presence of ledge, and the site is 15 miles from Worcester resulting in considerable dead-head travel.

Site 3a - Westborough, Bay State Abrasives, MP 31.1

This site is located on the south side of the right-of-way at MP 31.1, just east of the Bay State Abrasives major facility.

Site 3a has sufficient land for a full layover facility. However, it would require filling portion of the Great Cedar Swamp, which is an ACEC. Also, the distance from Worcester would result in considerable dead-head travel.

Site 3b - Westborough, Former Freight House, MP 31.6

This site, located on the south side of the right-of-way, is the lead track to the former Westborough freight house.

Site 3b has sufficient area for only a single-end, two track facility, with amenities. There is good road access. There would be limited access to train sets for maintenance and cleaning. A crossover track would be required to access the westbound mainline. The existing track on the site is a public delivery track. One access road to Bay State Abrasives would have to be closed. There is adjacent residential development. The site is 13 miles from Worcester resulting in considerable dead-head travel.

Site 4 - Westborough, Smith Valve, MP 33.9

This site, located on the north side of the right-of-way, is an existing siding formerly used to service the Smith Valve property.

Site 4 has sufficient area to provide a single ended facility with all amenities. Land area is basically uniform, at track level, and site development would not require extensive reshaping of the terrain.

Nearby residential development makes this site undesirable. A crossover track will be required if the second mainline track is restored; and the site, which is also a possible station site, is located 11 miles from Worcester.

Site 5 - North Grafton, G & U Railroad, MP 37.9

This site, located on the south side of the right-of-way, is owned by the Grafton and Upton Railroad and is used as a freight yard.

Site 5 has adequate space for only a single ended layover facility, provided changes were made to the G&U railroad tracks.

Access to the site is via a grade crossing of Route 30; a new crossover is required if the second mainline track is restored; the site is too small to develop access to trains for maintenance and cleaning; there are probable environmental concerns, including adjacent residential areas; and the facility is located 7 miles from Worcester.

Site 6 - Millbury, Wyman-Gordon Property, MP 38.2

This site is located on the south side of the right-of-way just west of the Millbury-Grafton town line.

Site 6 has sufficient land for only a single ended facility; the surrounding land is industrial, and good road access can be developed.

Disadvantages include the requirement for an additional cross-over if the second mainline track is restored; the site also is proposed as a possible commuter station; and it is located 5.2 miles from Worcester.

Site 7 - Worcester, at Route 20, MP 39.9

This site is located on the north side of the right-of-way, just east of the Route 20 crossing.

Site 7 can accommodate only a single ended layover facility, and good road access is available.

The track turnout must come off the inside of a 3 degree curve; an additional crossover will be required if double track is restored; the property is below grade, requiring a long lead track; the site is currently used for industrial purposes and would require relocation of several businesses; and the site is 4.5 miles from Worcester Station.

Site 8 - Worcester, Conrail Yard, MP 43.5

This site on the north side of the right-of-way, is located just east of the existing Amtrak Station in Worcester.

Site 8 could accommodate only a single ended facility with four tracks and most of the required amenities. It would allow for good access to the locomotives and most of the train sets, and is located less than 1 mile from the end of the commuter rail service. The surrounding area is industrial and the existing rail yard operations should preclude local opposition.

Topography of the area is such that retaining walls and embankment would be required; there may be conflicts with an existing sidetrack, and access to train sets would be restricted to small vehicles only.

Site 9 - Worcester, Jamesville Yard, MP 47.9

This area is an active Conrail freight yard and is too small for a layover facility.

Site 10 - Worcester, Providence and Worcester RR, MP 44.4

This site is a Providence and Worcester Railroad receiving yard and there is sufficient length to permit only a two track layover facility, located less than 0.5 from the commuter rail terminus.

The site would be under control of the P&WR Railroad dispatcher; it is too small to allow for amenities such as parking and service building; and there would be no access to train sets for maintenance and cleaning.

Site 11a - Worcester, Providence and Worcester RR, MP 2.0

This site is located on the east side of the right-of-way adjacent to the mainline of the P&W Railroad's Norwich line, and about 0.4 south of the junction with the Conrail mainline.

Site 11a is an active railroad area, with abutting land use consisting of industrial activity and a cemetery; there are no apparent environmental problems.

Extensive track work would be necessary to make the area available; there would be limited access to train sets for maintenance and cleaning; and trains would be under control of the P&W RR dispatcher.

Site 11b - Worcester, Providence and Worcester RR, MP 2.0

This area is about 0.2 miles southerly of Site 11a, also on the east side of the existing tracks.

Site 11b has sufficient area for development of only a single ended layover facility and amenities; the land is level and at the same elevation as the adjacent track; there is no apparent local opposition to use of the site and no apparent environmental problems.

The trains, however, would be under the control of the P&W RR dispatcher, and the site is 3 miles from the commuter rail terminal station.

8.3 Layover Site Screening and Recommendation

None of the thirteen potential sites identified have all the desired characteristics for a layover facility set forth in Section 8.1.

Rating of the sites was performed using four items ranked as important:

- Area for four train sets;
- Proximity to commuter rail terminal station;
- Access to train sets for servicing; and
- Area for personnel facilities and parking.

Evaluation of the identified sites resulted in elimination of all but three locations. Site 3a, Site 4, and Site 8 were each determined as viable potential sites that could be developed as layover facilities; however, Site 3a has a major environmental concern, in that site development would impact the Great Cedar Swamp, and Site 4 is proposed also as a commuter rail station.

Site 8 offers a location near the commuter rail terminal station, is located adjacent to the interim station, has no apparent environmental issues, and is located in an active rail area with primarily non-sensitive adjacent land uses. This site is the recommended location for development of the layover facility.

SECTION 9.0 ENVIRONMENTAL IMPACTS—LAYOVER FACILITY

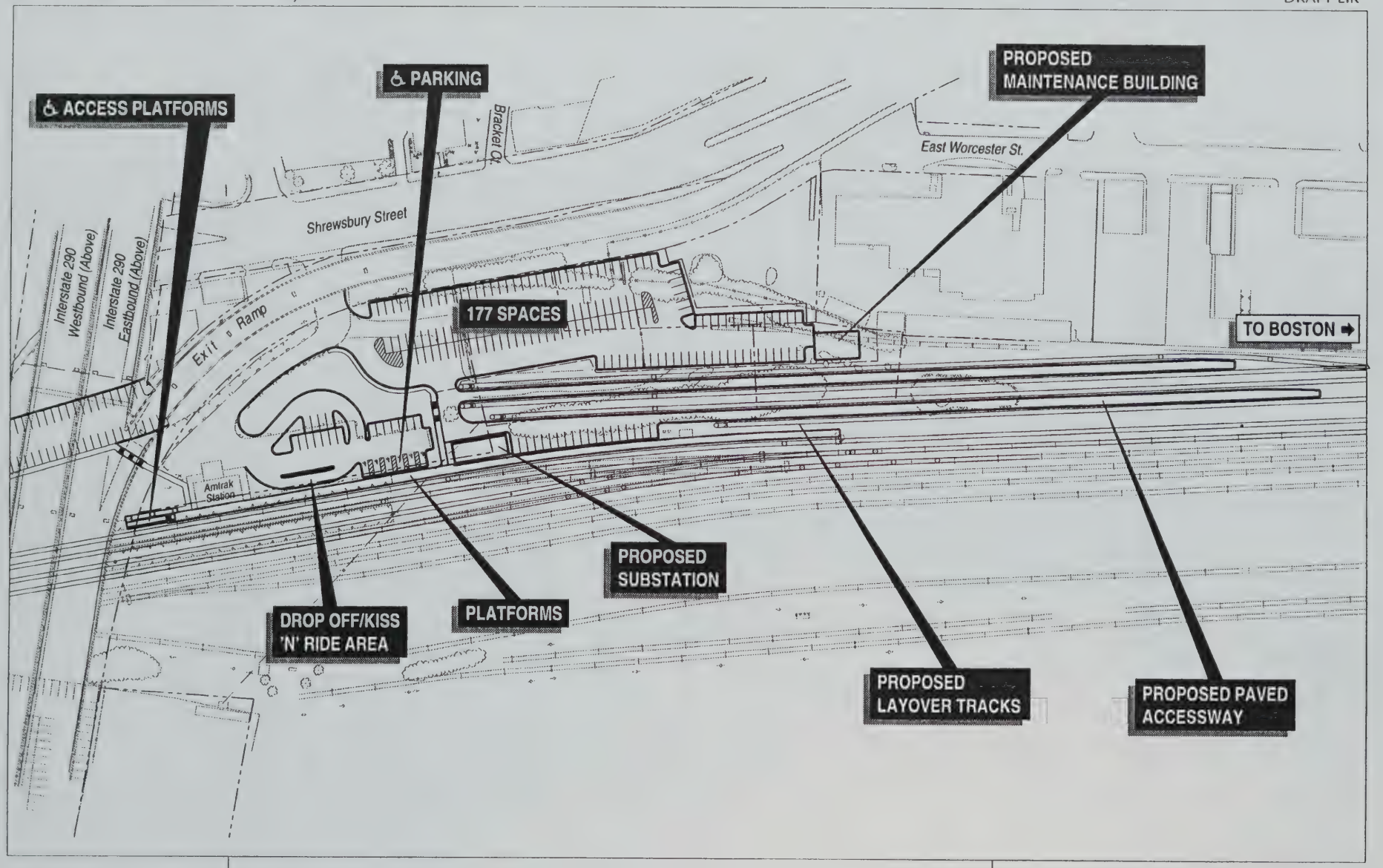
The proposed layover facility, which will accommodate four train sets, will be constructed in an existing rail yard east of the Amtrak Worcester Station at Mile Post 43.5. A site plan of the proposed layover site with preliminary track layout is shown in Figure 9.0-1. There are no sensitive environmental areas on site, such as wetlands or municipal water supplies. The surrounding land use is mostly industrial and includes Conrail yards and the Worcester Department of Public Works garage.

Our Lady of Mount Carmel Church and Mount Carmel Apartments, located on the north side of Shrewsbury Street opposite the layover facility, would be exposed to an L_{dn} of 70 dBA under a "worst case" scenario in which wayside power was lost for some reason and locomotives at the layover were required to idle from midnight to 6:00 A.M.; however, this noise level would be a minimal impact based on noise impact criteria. For the typical scenario in which locomotive idling begins at 5:15 A.M., there would be no impact.

Stormwater from all pavement areas in the layover facility will be collected and discharged into the City of Worcester existing stormdrain system. In the portion of the layover site where locomotives will be parked a separate drainage system will be constructed and connected to an oil separator.

An environmental site evaluation performed for the proposed layover facility and adjacent interim station determined that available evidence does not indicate the presence of oil or hazardous materials in the soil or groundwater other than trace levels of tetrachloromethane detected in one of the five groundwater samples obtained from the project site.

Construction of the layover facility will result in temporary short-term increases in noise, dust and construction related traffic.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 150'

0 150

SITE PLAN - LAYOVER FACILITY
WORCESTER, MA

FIGURE 9.0-1

9.1 Local Traffic

The proposed layover facility will provide twenty designated parking spaces for MBTA train crews and maintenance personnel. The layover facility will generate a low volume of traffic, generally at times far removed from the typical A.M. and P.M. peak hours, and thus will have no adverse effect on level of service on adjacent roadways. Traffic impacts resulting from commuter parking activity are addressed under the Interim Station in Section 10.1.

9.2 Air Quality

The passenger train layover facility is proposed to be located adjacent to the existing Amtrak Station in Worcester, directly east of I-290. The layover facility would consist of four sets of tracks to provide secure overnight storage for the trains. Trains will idle at the facility in the morning approximately 45 minutes prior to departure in order to warm-up and complete Federally-mandated testing procedures. Although the land use of the area surrounding the site consists primarily of rail facilities, highways, and some industry, there is a seven-story apartment building, Our Lady of Mount Carmel Apartments, located approximately 260 feet to the north of the site, separated by Shrewsbury Street and the I-290 exit ramp. This facility is an elderly residence and is therefore a sensitive receptor.

Although four locomotives will lay over at the facility, no more than two will be idling concurrently since their start-up schedule is staggered according to their departure times. Based on the proposed schedule of train departures, engines will begin idling on the following schedule:

Train	Departure	Begin Idle
502A	6:00 a.m.	5:15 a.m.
504A	6:50 a.m.	6:05 a.m.
506	7:20 a.m.	6:35 a.m.
506A	7:40 a.m.	6:55 a.m.

As a result of this schedule, the peak hour idling period will begin at 6:30 A.M., during which train #504A will idle for 20 minutes, #506 for 45 minutes, and #506A for 35 minutes for a total of 100 minutes of idling time.

Idle emission factors for the EMD 16-645E3B engine, used to power the F40PH-2C and F40PH-2 locomotives likely to see service on the Worcester Commuter Rail Extension, are provided by the *Locomotive Emission Study*, prepared for the California Air Resources Board, by Booz, Allen and Hamilton, Inc. The following emission rates are based on idle conditions operating at 17 horsepower:

Pollutant	**Emission Factor**
Hydrocarbons(HC)	137 grams per hour
Carbon Monoxide(CO)	445 grams per hour
Oxides of Nitrogen(NO_x)	1,717 grams per hour
Particulates(PM)	32 grams per hour

In addition to the emissions from idling trains, there will be automotive emissions associated with the commuter parking lot at the site. Initially, the parking lot will serve the Interim Service commuters commencing in the Fall 1994. Ultimately, the parking will be a permanent feature of the layover/Worcester Station. A traffic analysis of the parking lot driveway intersection with Shrewsbury Street was performed, making appropriate adjustments to the unsignalized intersection in order to use the CINCH program for signalized intersections to predict queue lengths and traffic delays. The rationale and methodology for the microscale analysis of automotive CO impacts is found in Section 12.2 of this document.

The two pollutants of primary concern relevant to the layover site are carbon monoxide and oxides of nitrogen. Carbon monoxide is a colorless, odorless gas produced through the incomplete combustion of organic fuels. When combined with the hemoglobin in the blood, it reduces the ability of blood to carry oxygen. In high enough concentration, it can be fatal. Oxides of nitrogen represent a number of compounds produced during combustion. NO_2 is a brownish gas with a pungent odor. It is a pulmonary irritant and short exposures may increase susceptibility to acute respiratory disease.

An analysis of the impacts of the train and automotive emissions on the sensitive receptor site to the north of the layover site was performed using U.S. EPA's CAL3QHC modeling methodology to predict pollutant concentrations near roadway facilities. In applying the methodology to the layover facility, the individual locomotives were modeled as queuing links similar to the automobiles delayed at the intersection. The analysis was performed using worst-case assumptions regarding the location of the locomotives in relation to the receptor site. That is, the locomotive with the longest idle time during the peak idle hour (#506) was assumed to be located closest to the receptor on the northernmost track, #506A was assumed to be on the adjacent track, and #504A was assumed for the third track. The automotive emissions were analyzed for the 1996 A.M. peak hour traffic and for the maximum

8-hour average period. Because the apartment building is seven stories, pollutant levels were modeled at three elevations (2, 10, and 18 meters).

CAL3QHC produces results based on variations in wind direction. Logically, given the orientation of the layover facilities to the receptor site, a southerly wind direction produces the worst-case results in terms of predicted CO levels. Under conditions with a wind angle of 160 to 180 degrees (south-southeast to south), CO levels are predicted to increase by only 0.1 ppm due to the combination of train and automotive sources. With an estimated ambient background CO level of 3.0 ppm, the predicted 1-hour CO levels at the Apartments range from 4.7 ppm at the first floor level to 3.8 ppm at the third floor. The 8-hour levels, including a background of 2.0 ppm, range from 3.3 ppm at the first floor to 2.7 at the third floor. The sidewalk area between the Apartments and Shrewsbury Street would have 6.6 ppm for the 1-hour period and 4.7 ppm for the 8-hour period. Compared to the 1-hour standard of 35 ppm and the 8-hour standard of 9 ppm no violations will occur.

The idle emission rate of the EMD 16-645E3B for NO_x is relatively higher than the corresponding rates for the other pollutants. Given a total idle time between the three locomotives during the peak hour of 100 minutes, this results in emissions of 2.86 kilograms of NO_x within a one-hour period.

Although not designed for the purpose of estimating NO_x levels, a second analysis was performed using CAL3QHC to analyze NO_x in the vicinity of the layover site. NO_x consists of NO, NO_2, and other oxides of nitrogen. NO_x reacts with volatile organic carbons to form ozone. There is no separate health standard for NO_x. A standard, though, does exist for NO_2, and this is 0.05 ppm averaged over a one year period of time. Further, because of variations in the dispersion and reactivity characteristics between NO_x and CO, the results of the CAL3QHC procedure, which was designed to estimate CO levels, cannot be considered as a definitive estimation of NO_x levels at the receptor site. The results of a CAL3QHC analysis, therefore, can be used only as a preliminary indicator. Assuming both worst-case south-southeasterly and southerly wind conditions and that the locomotive NO_x emissions are composed entirely of NO_2 emissions, this would result in a small increase of NO_2 emissions at the apartment facility during the early morning hours but would not result in a violation of the NO_2 standard.

Given these findings, meteorological data was obtained from the Massachusetts Department of Environmental Protection to determine the likelihood of wind angle conditions which could produce these worst-case results. Winds in the Worcester area were observed to be primarily westerly during all four seasons. On an annual basis, winds out of the south and southeast occur with a frequency of less than eight percent, reducing the likelihood of undesirable pollutant levels at the receptor site.

9.3 Noise and Vibration

A layover facility can be a source of noise complaints because much of the activity of the layover facility takes place during nighttime hours. In addition, the frequency-related characteristics of the noise generated by certain layover operations may be considered more intrusive than normal train noise.

For the proposed layover facility in Worcester, most of the surrounding land use is industrial or commercial, save for one residential building and a church near the site. Noise impact criteria for both of these land uses are based on both the proposed Federal Transit Administration (FTA) criteria for train operations, as well as the Massachusetts Department of Environmental Protection (DEP) policy on pure-tone noise sources. Details on the methodology used to estimate layover facility noise are given in Appendix 3, Noise and Vibration.

Noise Impacts from Layover Facility Operations

Our Lady of Mount Carmel Church and Mount Carmel Elderly Housing Apartments are located adjacent to the Shrewsbury Street I-290 exit ramp in downtown Worcester, approximately 300 ft from the centerline of the proposed layover facility. The existing L_{dn} measured at a location in the apartment building directly facing the facility was 76 dBA. The noise environment here is dominated primarily by traffic from I-290. Given the relatively high existing ambient noise level, the onset of impact would occur if noise from layover facility operations reaches 65 dBA L_{dn}, and consideration of mitigation would be necessary if site related noise levels reach 74 dBA L_{dn}, according to the noise impact criteria.

Most of the community noise complaints related to layover facilities are caused by operations in the late night or early morning hours, particularly from locomotives idling for extended periods of time. In very cold weather, locomotives are sometimes required to run overnight to avoid problems with restarting the engines in the morning. While other sources of noise do exist, such as wheel squeal on short radius curves, train whistles used for signaling during switching operations, air discharge from brake release, electricity substations, and PA systems, most complaints relate to the constant noise level generated by running locomotive engines. For this reason, the only layover facility noise sources considered in the impact assessment were locomotives idling during off-service nighttime hours.

Measurement data from actual MBTA locomotives in service at a maintenance terminal were used to develop a noise model for the proposed layover facility. It was found that noise levels varied depending on the model or age of the locomotive, and

whether head-end power (commonly known as "hotel power") used for interior lighting, heating, and ventilation, of the coaches was being provided by the locomotive engine.

Assumptions were made for two scenarios, one representing a worst-case condition in which locomotives were required to idle from midnight to 6:00 A.M., and the other representing a more typical procedure where the engines were started at 5:15 A.M. and idle for 45 minutes before beginning scheduled service.

It was found that Our Lady of Mount Carmel Church and Apartments would be exposed to an L_{dn} of 70 dBA from the layover facility under the worst-case idling scenario (6 hours), while the L_{dn} generated by the shorter idling duration (1 hour) would be 62 dBA. The latter case would not result in any noise impact according to the project criteria, while the worst-case condition would only be considered a minimal impact and not severe enough to require mitigation.

Mitigation

A simple mitigation measure for layover facility noise is to limit the amount of locomotive idling time during the late night and early morning hours. To avoid noise impact entirely at the apartment building would mean no more than a two-hour duration each morning of locomotive idling for the purpose of warming up the diesel engines. In extremely cold weather, however, longer idling periods may be unavoidable in order to prevent operational delays.

It should also be noted that in the case of the newer 1050-series locomotives, for which there are two separate engines to drive main power and head-end power respectively, it was assumed that **only the main power engine** would be idling during the layover period. To avoid the need for head-end power to be supplied by the locomotives, the layover facility will be equipped with reliable power outlets so that the addition of noise emitted by the auxiliary engine can be avoided. If available, the use of plug-in electric power sources for the main power engine will also be used.

Pure Tone Analysis

The annoyance caused by noise from idling locomotives is often heightened by the low frequency characteristic of locomotive noise. This often occurs in the form of "pure tones," or peaks in the sound frequency spectrum at one or more discrete frequency bands in the 30 to 80 Hz range that can increase the community annoyance. There are two features of low frequency sound that can cause problems: (1) sound waves at these frequencies propagate over distance with less attenuation than higher frequencies, and (2) sound waves at these frequencies tend to penetrate exterior walls with much less attenuation than higher frequencies. The result inside

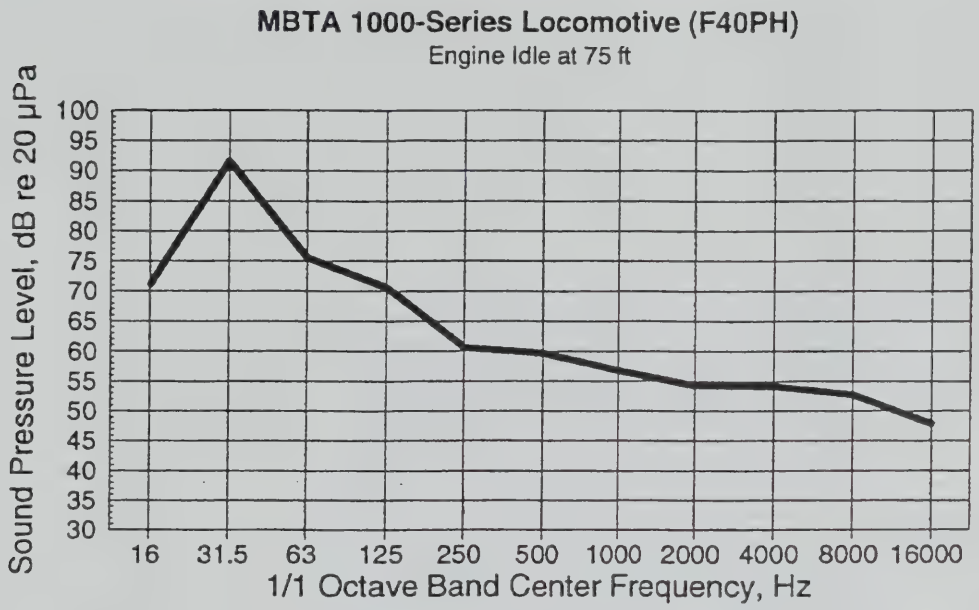
buildings is an enhancement of the low frequency "throbbing" quality of locomotive noise. While the A-weighted sound level may appear to be low, experience has shown that sound dominated by low frequency energy still causes annoyance. In addition, pure tones at specific frequencies in this range are likely to excite resonances in building components (floors, ceilings, windows), causing them to vibrate. This effect is sometimes mistakenly thought to be caused by ground-borne vibration and is almost always annoying to occupants.

Within the MBTA locomotive fleet, there are variations in the frequency characteristics of idling noise. As shown in the octave band sound spectra in Figure 9.3-1, the older 1000-series locomotives (top graph) appear to exhibit a more pronounced tone at about 30 Hz than the newer 1050-series, which shows broader band energy spread over the 30 to 60 Hz range.

According to DEP guidelines, the sound characteristics generated by the older 1000-series locomotives would be considered to contravene the Massachusetts noise policy, by satisfying the DEP's definition of a "pure tone," i.e., the peak exceeds each adjacent octave band sound pressure level by more than 3 dB. Strictly speaking, the measured sound spectra of the newer 1050-series locomotives did not exhibit this same tonal result and would be considered to meet the policy. While it cannot be guaranteed that older equipment will never be stored in the Worcester layover facility, the MBTA has on order new locomotives to be dedicated to the Worcester service, and potential creation of the "pure tone" conditions is not anticipated at the layover site.

Construction Impacts/Mitigation

Construction of the layover facility is expected to include activities similar to those required for station construction, such as clearing, excavation, foundation work, equipment installation, paving and finishing. In addition, installation of new ballast and track as well as switching and signaling equipment will be required at the storage yard. Construction machinery is likely to include types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes, and trucks. For trackwork, specialized equipment will be needed to handle ballast, rails and ties. Site grading and track work can likely be essentially completed in one construction season. Construction will typically occur during 8 to 10 hour weekday, daytime periods.



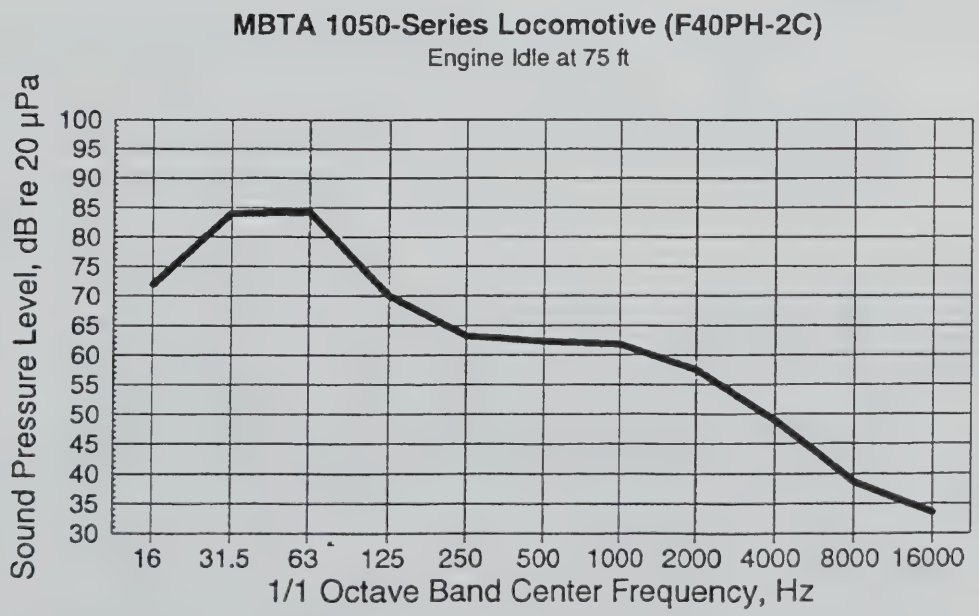


Figure 9.3-1 Octave Bank Sound Spectra from Idling MBTA Locomotives

Construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990). Details on these procedures and the criteria used to assess impacts are given in Appendix - Volume II, Section 3.

Noise

The results indicated little potential for noise impact from trackwork; however, sensitive receptors within about 250 ft of the closest area of facility construction are expected to experience short-term noise impact during construction of the layover facility. Our Lady of Mount Carmel Apartments, located within about 250 ft of the northern edge of the layover facility parking area, may be within the noise impact zone for a limited period of time.

A number of measures can be taken to minimize noise impacts without placing unreasonable constraint on the construction process or measurably increasing costs. These include: (1) noise monitoring to ensure that contractors take all reasonable steps to minimize noise, (2) inspecting and noise testing of equipment to ensure that all equipment on the site is in good condition and effectively muffled, and (3) an active community liaison program.

Vibration

The limiting distance for vibration impact from construction of the layover facility, as from general construction activity, was found to be about 85 ft with actual trackwork having minimal effect on the resulting vibration levels. The only sensitive receptors in the vicinity, the church and the apartment building, do not fall within this impact distance.

9.4 Site Drainage

The proposed layover facility site lies within the Blackstone River watershed, just north of the Conrail yard at Mile Post 43.5. The site area has irregular topography, overgrown with vegetation and includes portions of an existing automobile storage yard and railroad siding.

The proposed layover site drains generally in a northeasterly direction towards existing public works maintenance facilities owned and operated by the City of Worcester. The westerly end of the site drains in a northwesterly direction towards

the existing automobile storage yard. Due to the irregular topography, portions of the site currently retain and infiltrate some stormwater runoff.

The proposed layover facility will consist of new railroad tracks, designed to accommodate four 9-car train sets, internal access driveways, an electrical substation, a 30 foot by 50 foot maintenance building, fencing, lighting, fire hydrants and an employee parking lot. The proposed drainage system will include catch basins equipped with sumps and oil and grease traps. These basins will collect stormwater from all new pavement areas within the facility and will connect into existing City of Worcester stormdrain systems. Other unpaved areas within the site will be graded and vegetated to match existing site conditions and no increase in peak flows will occur at the site discharge points.

A separate drainage system will be constructed at the western-most portion of the layover facility, where locomotives will normally be stored. This system will consist of oil drip pans (to be located directly under the areas where the locomotives will be parked) and connected to a 1500 gallon oil separator. The oil separator will include a series of baffles and other elements to maximize the separation of stormwater from oils, greases and fuels, access manholes, venting piping and a sensor pipe. The oils, greases, and fuels will rise to the top of the separator where they can be easily pumped out, on a routine maintenance program as well as from any accidental spills, and legally disposed of.

All elements of the proposed drainage system will be coordinated with the City of Worcester, Department of Public Works.

9.5 Hazardous Materials

An environmental site evaluation was performed for the proposed Layover Facility and Interim Station site. The purpose of the evaluation was to determine whether hazardous material or oil may be contained in the soils or groundwater at the site, within the meaning of Massachusetts General Laws, Chapter 21E ("21E"). The purpose of 21E and its implementing regulations (310 CMR 40.00 - The Massachusetts Contingency Plan) is to "ensure the protection of health, safety, public welfare, and the environment by establishing requirements and procedures for the discovery, notification, assessment of, and response to, releases and threats of releases of oil or hazardous materials, and by identifying these oils and hazardous materials which are subject to these requirements and proceedings."

The environmental site evaluation consisted of the following elements:

1. A review of the site's history which indicated that, since 1892, the majority of the site has been used as a railroad yard with various railroad sidings. Other uses of the site and adjacent areas have included woodworking shops, lumber storage yard, a stone cutting and supply facility, a wholesale beef company, a used car lot, carpenter shop, paint shop, and plumbing supply shop. More recent uses include an automobile storage yard and the Amtrak railroad station with associated roads and parking areas.

2. A review of state and local records which indicated no record of spills or releases of hazardous materials or oil at the site. Even though the DEP "List of Confirmed Disposal Sites and Locations to be Investigated" did not include the project site, two sites within ¼ mile of the project site were listed:

   - Pat's Service Station, located adjacent to the northwest corner and cross-gradient of the project site, is listed as a confirmed site.

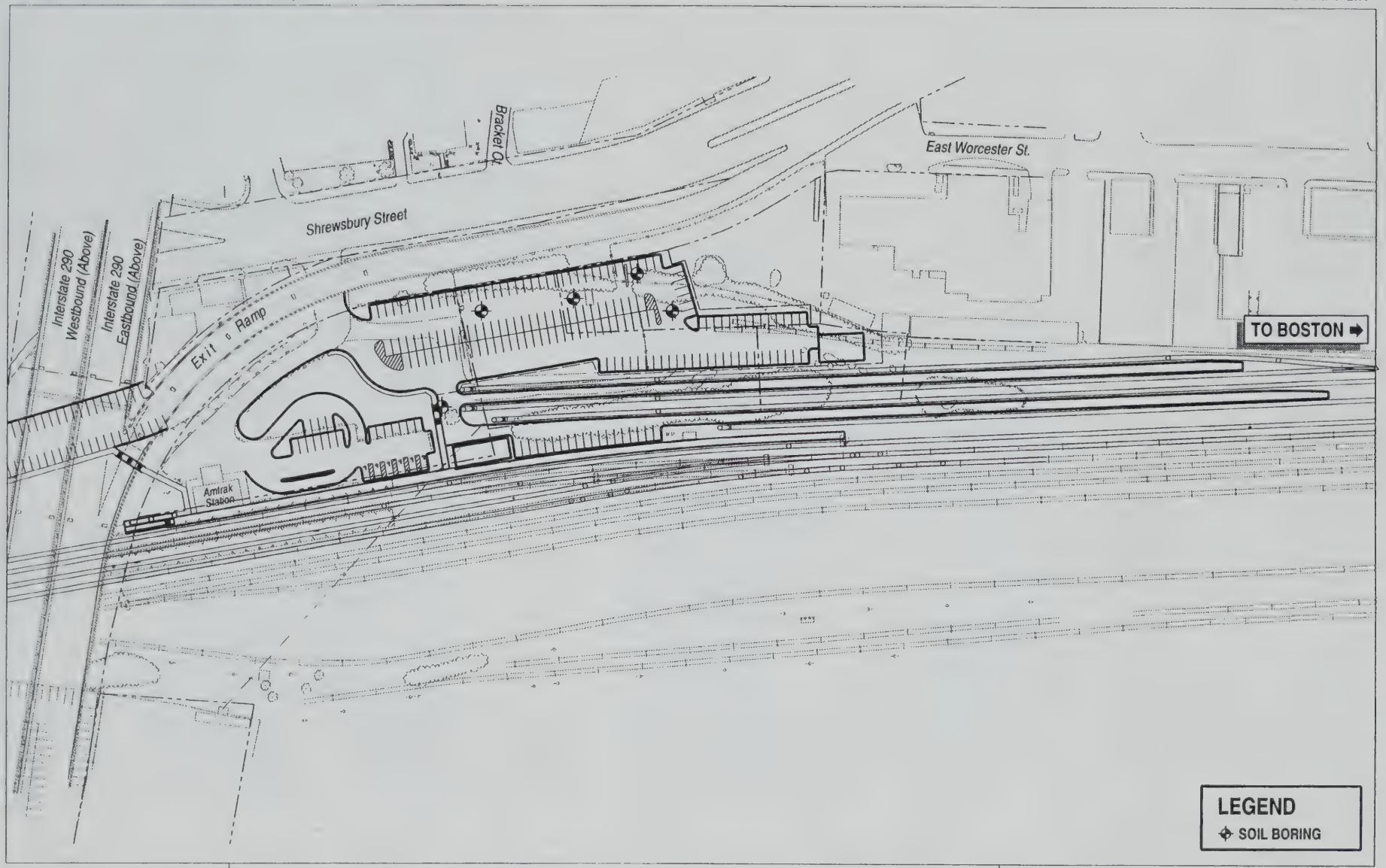
   - White and Bagley, located approximately ¼ mile west and down-gradient of the project site, is listed as a "Location to be Investigated".

3. A subsurface exploration program which consisted of five soil borings and the installation of five monitoring wells. Figure 9.5-1 shows the location of the soil borings and wells. The soil boring logs are available at the MBTA project office.

4. Soil and groundwater samples were analyzed in a laboratory by chemical screening methods, which were used to identify and measure relative levels of volatile organic compounds (VOCs).

The results of the environmental site evaluation do not indicate the presence of oil or hazardous materials in the soil or groundwater at the project site other than trace levels of tetrachloroethane detected in the one of the five groundwater samples. More specifically, the environmental site evaluation indicated the following:

- Total volatile organic compound (VOC) concentrations ranged from none to 1.0 parts per million in the 27 soil samples. These concentrations are considered representative of background levels in urban areas.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 150'
0 150

SITE PLAN - HAZARDOUS MATERIALS INVESTIGATION (21E) WORCESTER, MA

FIGURE 9.5-1

- None of the 23 common VOCs were detected in the five groundwater samples taken with the exception of trace levels (15 parts per billion) of tetrachloroethane detected in one of the samples. This level is below the reportable concentration levels for groundwater category 2 listed at 3,000 parts per billion in the MCP.

- Results of the pH and specific conductance screening analyses indicated that the pH ranged from 5.9 to 6.2, typical for New England groundwater. The specific conductance levels are slightly elevated but these are assumed to be attributed to the application of road salt to the surrounding streets and parking areas.

9.6 Construction

Construction of the layover facility will result in short-term impacts, primarily vehicular traffic delivering construction materials, temporary noise increases and dust from construction activities. Most of the construction related to trackwork will have no offsite impacts, in that materials and specialized equipment needed will access the site via existing tracks.

9.7 Proposed Mitigation and Mitigation Options

Dust from construction activity can be minimized by an effective program of spraying water on exposed earth surfaces subject to vehicular traffic.

Hay bale and silt fence barriers will be employed to minimize the effects of erosion and sedimentation resulting from stormwater runoff.

A number of measures can be taken to minimize construction noise intrusion without placing unreasonable constraint on the construction process or measurably increasing costs. These include: (1) noise monitoring to ensure that contractors take all reasonable steps to minimize noise, (2) inspecting and noise testing of equipment to ensure that all equipment on the site is in good condition and effectively muffled, and (3) an active community liaison program.

SECTION 10.0 ENVIRONMENTAL IMPACTS - WORCESTER INTERIM STATION

As described in Section 3.0, the Worcester Interim MBTA Station will be located at the Amtrak Station site off Shrewsbury Street in Worcester. The focus of this section is on local traffic impacts since other environmental issues were addressed in the discussion of the adjacent Layover Facility in the preceding Section 9.0.

While use of the interim station is anticipated to end in late 1997 when facilities will be relocated to the nearby Union Station upon completion of restoration, commuter rail passengers will continue to utilize parking areas constructed for the interim station. Thus, traffic analyses were performed for existing conditions and "Build"/"No Build" conditions for the years 1996 and 2001.

The results of the Level-of-Service (LOS) analyses indicate that no change in LOS will occur at the intersections analyzed as a result of traffic volume increases generated by the Interim Station.

10.1 Local Traffic

This section provides a summary of the complete traffic analysis included in Volume I, Section 1.0 of the Appendix. This section summarizes existing traffic conditions in Worcester, projected ridership for the Worcester Interim Station, and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Worcester Interim Station focused on the site's access to Shrewsbury Street and on the westbound Shrewsbury Street intersection with the Washington Square rotary. Figures 10.1-1 (A.M. Peak Hour) and 10.1-2 (P.M. Peak Hour) show the location of the intersections that were analyzed as part of the study.

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1200'±
0 1200

A.M. Peak Hour
7:30 - 8:30 A.M.
1992 Existing Conditions
INTERIM STATION, Worcester

FIGURE 10.1-1

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1200'±
0 1200

P.M. Peak Hour
4:30 - 5:30 P.M.
1992 Existing Conditions
INTERIM STATION, Worcester

FIGURE 10.1-2

There have been numerous traffic studies conducted for the Washington Square area of the City of Worcester in recent years. This area has been and is being studied by projects to construct the Fallon/St. Vincent Medical City, the Worcester Convention Center, the revitalized Galleria Mall, the City of Worcester's Gateway project, and the proposed intermodal transportation facility which includes a proposal to replace the Washington Square rotary with a signalized cross road intersection.

Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection. A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours. These are the periods when traffic conditions are heaviest. The A.M. and P.M. peak hours for the study area are 7:30 to 8:30 A.M. and 4:30 to 5:30 P.M., respectively.

Existing Conditions

Traffic data from recent previous studies were used to develop existing traffic volumes. The volumes were used to calculate existing condition levels of service for the intersections within the study area. Figures 10.1-1 and 10.1.2 show the A.M. and P.M. peak hour volumes within the study area.

Table 10.1-1 shows the results of the LOS analysis. As shown, traffic from Shrewsbury Street entering Washington Square operates at LOS F in both the A.M. and P.M. peak hours. In the P.M. peak hour, traffic turning left from Shrewsbury Street to Mulberry Street and traffic exiting the site driveway are at LOS F.

Table 10.1-1 1992 Unsignalized Intersection Level of Service

Worcester	Peak Hour	
	A.M.	P.M.
Washington Square Rotary		
WB Shrewsbury Street	F	F
Shrewsbury with Site Driveway		
LT from EB Shrewsbury	B	F
LT from WB Shrewsbury	A	A
All from Site Driveway	D	F

Safety Concerns and Accident History

The Worcester Police Department was contacted to determine if the intersections analyzed are safety concerns or high accident locations. According to the Department, neither intersection is a serious safety concern or a high accident location. Neither intersection is on the Massachusetts Highway Department's latest top 1,000 high accident intersection list for the Commonwealth.

Rail Ridership Projections

Projections of rail ridership for each of the proposed stations of the Worcester Extension Project, prepared by the Central Transportation Planning Staff (CTPS) are included in the Appendix - Volume II, Section 2. CTPS projected that the Worcester Station with basic or expanded service in operation would attract a total of 369 daily round trip commuters in 1996. Twenty of these patrons would walk to the station and 28 are projected to be dropped off. The remaining 321 patrons will drive to and park at the station.

The patrons of the Worcester Station are projected to originate from the towns of Auburn, Holden, Leicester, Paxton, Spencer, West Boylston, and from the City of Worcester. Table 10.1-2 shows the town of origin for the projected Worcester Station riders.

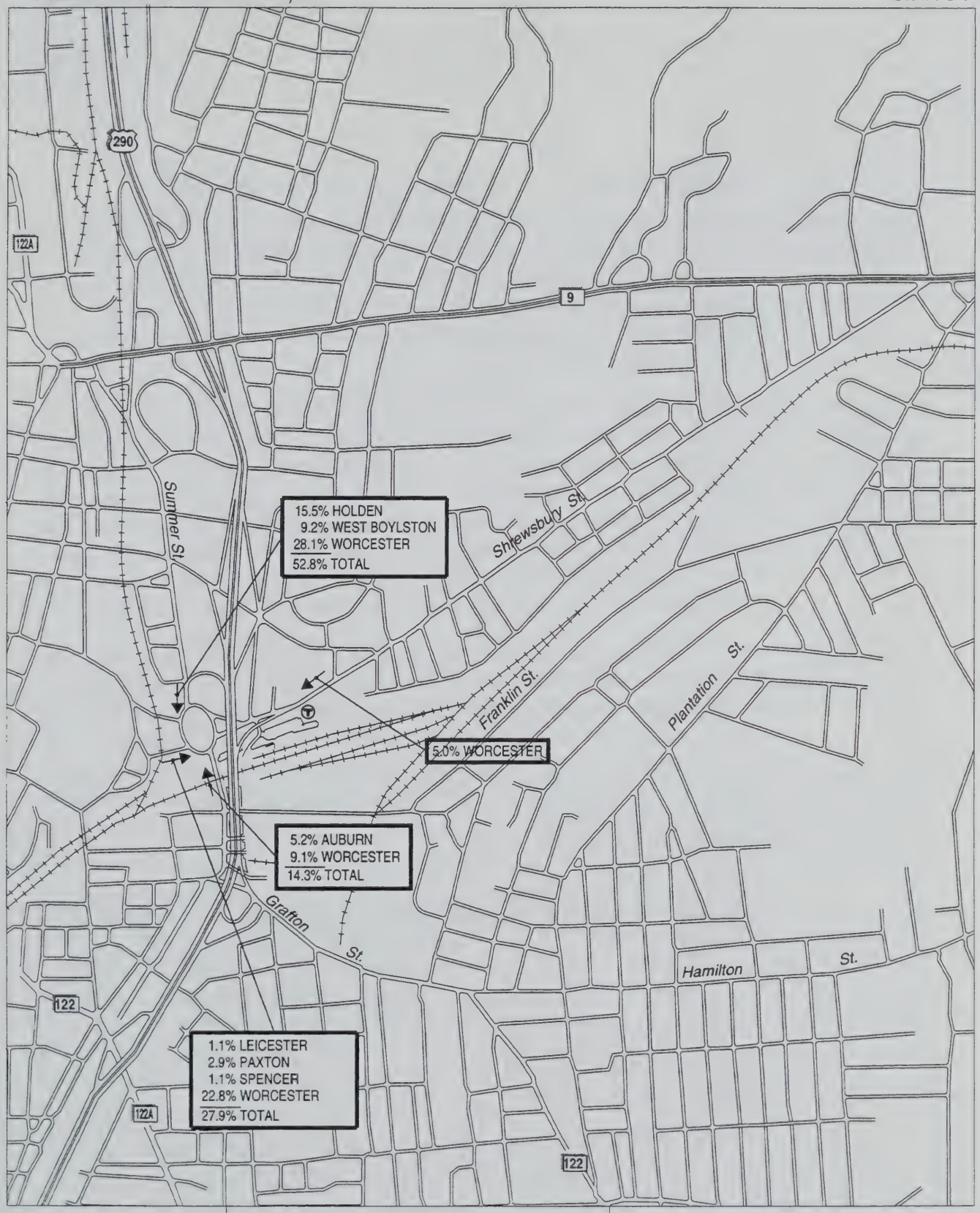
Table 10.1-2 Town of Origin - Year 1996 Projected Ridership Worcester Station

Town	Riders
Auburn	18
Holden	54
Leicester	4
Paxton	10
Spencer	4
West Boylston	32
Worcester	247
TOTAL	**369**

The impact of the commuter rail riders on area streets as they travel to the Worcester Station is determined by assigning those commuters to their most likely route in the study area. Riders who live in Worcester would use a variety of travel routes depending on the location of their residence. Riders from towns outside of Worcester were assigned to the major routes leading from their town to the proposed interim station. Figure 10.1-3 shows the projected distribution and percentage of station related traffic that would use Worcester area roadways.

Assignment of Riders to Trains

Commuter rail riders to the Worcester Station would arrive at the station to board one of four A.M. peak period trains and would leave the station in the P.M. peak period based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several MBTA commuter rail lines. The observations of distribution by train tend to show the greatest number of riders on the trains arriving at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, the observations also show greater ridership in the middle of what is normally considered peak commuting period between 4:00 and 6:00 P.M.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1200'±

0 1200

Distribution of Commuter Rail Station Traffic 1996

INTERIM STATION, Worcester

FIGURE 10.1-3

1996 Traffic Impacts

The 1996 traffic impacts must also consider background traffic growth in addition to existing traffic volumes and new trips destined for the station. To account for normal background growth, a growth factor of 0.5% was assumed from 1992 to 1996. Also, several major traffic generating projects, which would impact the study area, may be in place by 1996. The anticipated traffic from these projects was also included in the 1996 "No Build" volumes.

The traffic impacts of both a "No Build" and "Build" alternative were analyzed. The 1996 "No Build" alternative allows a comparison with the 1996 traffic impacts of building the commuter rail station. The "Build" alternative did not assume any redistribution of existing traffic on local roads. In other words, the commuters driving to the rail station were considered to be new trips. In actuality, some of those who would drive to the station are already on the road, specifically on Shrewsbury Street. Their trip will be shortened by driving to the station. The "Build" analysis, therefore, does some double counting of vehicles and tends to be a worst case analysis.

Table 10.1-3 shows the results of the LOS analysis for both the "No Build" and the "Build" conditions. No decrease in level of service will occur between the "No Build" and "Build" condition for any of the movements analyzed. Those movements which function at LOS F in the existing condition will function at LOS F in the year 1996. Traffic exiting the site driveway will experience a minor improvement in level of service in the P.M. peak hour. This is due to the fact that no appreciable traffic will exit the site until the first train arrives from Boston, which will occur after the local peak traffic hour.

Table 10.1-3 1996 Unsignalized Intersection Level of Service

Worcester	A.M. Peak Hour		P.M. Peak Hour	
	No Build	Build	No Build	Build
Washington Square Rotary				
WB Shrewsbury Street	F	F	F	F
Shrewsbury with Site Driveway				
LT from EB Shrewsbury	C	C	F	F
LT from WB Shrewsbury	A	A	A	A
All from Site Driveway	E	E	F	E

Year 1996 Worcester Station Only

Interim service, which commenced on September 26, 1994, is anticipated to attract up to 300 patrons on three trains leaving the Worcester Interim Station between 5:45 A.M. and 7:15 A.M. and returning from Boston between 5:55 P.M. and 7:00 P.M. The traffic impacts associated with the station traffic were judged not to be significant, due to the fact that most of the traffic to or from the station will occur outside of the A.M. and P.M. peak hours.

The Secretary's Certificate does not allow for an increase in interim train service to basic or expanded service until the proposed section of double track is constructed and at least one suburban station is on line for service with the interim Worcester Station. It is very unlikely that only one suburban station will come on line. Thus a Grafton or Millbury Station will divert a large portion of the commuters that drive to Worcester if Worcester were the only station, keeping the traffic volumes at or below 1996 "Build" condition levels.

2001 Traffic Impacts

The LOS analysis is presented for the Worcester study area using 2001 traffic volumes and ridership projections. Background traffic was assumed to grow at a rate of 1.5% per year between 1996 and 2001.

CTPS projected that the Worcester Station is expected to attract 390 round trip commuters in the year 2001, 340 of which will be Park'n'Ride patrons. Some minor shifting in the town of origin of the patrons utilizing the Worcester Station is expected in 2001. However, traffic will be distributed along the same routes as shown in Figure 10.1-3.

The results of the LOS analysis for the year 2001 are shown in Table 10.1-4. As shown, none of the movements analyzed will have a reduction in level of service in the "Build" condition. The same movements which operate at LOS F in the existing condition will operate at LOS F in the year 2001. As in the 1996 analysis a slight improvement in level of service will be realized at the site driveway in the peak period.

Table 10.1-4 2001 Unsignalized Intersection Level of Service

Worcester	A.M. Peak Hour		P.M. Peak Hour	
	No Build	Build	No Build	Build
Washington Square Rotary				
WB Shrewsbury Street	F	F	F	F
Shrewsbury with Site Driveway				
LT from EB Shrewsbury	C	C	F	F
LT from WB Shrewsbury	A	A	A	A
All from Site Driveway	E	E	F	E

Summary of Findings

The results of the LOS analysis indicate that no changes in levels of service at the intersections analyzed will occur due to traffic generated by the Worcester Interim Station.

10.2 Proposed Mitigation and Mitigation Options

The effects of traffic from the Interim station on adjacent streets and intersections were reviewed to determine if any mitigation is necessary in accordance with the MBTA Mitigation Policy presented in Section 3.7.

No adverse impacts to station area streets are anticipated due to traffic generated by the commuter rail station. Therefore, no mitigation is required or proposed.

SECTION 11.0 ALTERNATIVE COMMUTER RAIL STATION SITES/STATION DESIGNS

In addition to the Worcester terminus, the commuter rail extension project proposes five intermediate stations along the route—one in each of the towns traversed by the rail corridor. More than thirty sites were evaluated in detail in the process of identifying the proposed terminal and intermediate stations. Local officials and appointed town rail committees also provided input to the identification and evaluation process. Consideration was given to a regional station at I-495; however, this option proved to be impractical as a near-term goal (see Section 17).

Several alternative station platform designs also have been evaluated to address railroad operating issues and passenger access concerns. These items are discussed in Section 11.8.

11.1 Site Identification and Evaluation Criteria

This Section describes the procedures of identifying potential station sites, the criteria used to determine the preferred sites, and community involvement in the site selection process. Also discussed is the relationship between each of the stations and options for fewer than five intermediate stations, including optimal spacing or distance between stations.

Identification of Potential Station Sites

The five intermediate station sites were selected after a review of the entire rail corridor and specific analysis of many potential sites. Resources employed in the identification process included aerial maps of the rail corridor, travelling the entire corridor in a specially equipped rail vehicle, and field checking in detail the most promising sites. Additional input was solicited from the Planning Department in each community.

The initial sites evaluated included the station stops identified in the 1990 Feasibility Study and the original station stops that once served this corridor while commuter rail was operated between Worcester and Boston. Some of the former station stops such as Ashland Center and Westborough Center are still identifiable because the historically significant station structures are still present.

Coordination meetings were held with elected officials in each of the corridor towns as part of the site selection process. The Boards of Selectmen in Westborough, Ashland, Southborough and Millbury appointed special citizen committees to study project issues. The committees in Westborough and Ashland analyzed some 8-10 potential stations in their respective communities and performed their own site evaluations. The reports of those committees also were used in the evaluation process and are available from the MBTA.

In response to numerous requests by land owners, specific sites that were on the market were investigated. Other potential station locations were suggested by local business owners.

Evaluation Criteria

The following criteria were used to evaluate the potential station sites:

- Site Capacity
- Traffic and Access
- Neighborhood Impacts/Concerns
- Availability of Land
- Environmental Considerations
- Joint Development Potential

Site Capacity

Station sites must be able to accommodate 800 foot long platforms on a relatively straight section of track and have an area large enough for required parking. Parking requirements vary depending on location but the MBTA desires a parking area of at least 250 spaces with the capacity for expansion in the future. The capacity requirements for today's intermodal commuter rail facilities rule out the historical station locations that generally had little or no parking and limited potential for expansion due to their location in heavily built up areas.

Traffic and Access

To function properly as an intermodal transportation facility, the stations must be situated so that riders can reach the station easily. The station must be served by relatively major roads and be an acceptable distance from residential centers.

Neighborhood Impacts/Concerns

Commuter rail is generally perceived as a very desirable community asset but it is important to respect existing neighborhoods, especially concerning potential traffic impacts. Local street access to a station is undesirable.

Availability of Land

This criterion relates to the cost of acquiring the site as well as other issues such as displacement or relocation of existing residents or businesses. It is more desirable to select an undeveloped site where the cost of the site is based on the land value alone. Developed sites with structures, especially residential buildings or functioning businesses, should be avoided unless no other option is possible.

Environmental Considerations

A wide range of environmental issues must be considered but the potential for adverse impacts to wetlands was considered the critical issue that would eliminate potential station sites from further evaluation. Large wetland areas in Westborough are in an Area of Critical Environmental Concern (ACEC) and could not be developed for a station parking area. Wetlands in other areas also present limitations on site development potential.

Joint Development Potential

Since the proposed project represents a significant investment of public funds, it is desirable to focus this investment where it may contribute to or complement private development leading to growth in jobs and economic opportunities for area residents.

Determination of Number and Location of Intermediate Stations

There is a direct relationship between total trip time and the total number of stops. With a projected rail travel time of approximately 1 hour between Worcester and Boston, the cumulative effects of each additional station stop, which adds 2 to 3 minutes to the trip, can make commuter rail less competitive with the private automobile or bus.

The ideal situation for Worcester commuter rail users, in terms of lowest trip time, would be no intermediate stops. The extension project was judged feasible based on a projected one-way ridership of approximately 2,500 people, far in excess of the projected riders from a Worcester station alone; thus, intermediate stations are required.

The goal of the intermediate station location process was to select the combination and location of the fewest number of stations that would attract at least 2,500 riders each way.

The Feasibility Study proposed a Worcester station and three intermediate stations, as follows:

Municipality	Location	Parking Spaces
Ashland	Howe Street	685
Westborough	Fruit Street	1,000
Grafton	Pine Street	250
Worcester	Amtrak Site	500
		Total Spaces: 2,435

The Howe Street location in Ashland did not stand up to the closer scrutiny given to sites during the schematic design phase. Traffic impacts to local streets and availability of the land were two issues that diminished the value of this site. Additionally, Ashland's Study Committee selected the Pleasant Street site as more closely meeting the Town's criteria for a local commuter rail station.

The Fruit Street site in Westborough was the "Regional Station" proposed in the Feasibility Study. However, the costs of providing access from the Massachusetts Turnpike and I-495 were found to be prohibitive. Wetland impacts within the Cedar Swamp Area of Critical Environmental Concern (ACEC) also were associated with the development of access to the site. Finally, the Fruit Street site would also have involved displacement of several residences and commercial property.

With the elimination of two of the three intermediate stations proposed in the Feasibility Study, a search was conducted for station sites that would attract riders from population centers to a regional station at I-495. A regional station at I-495 was judged to be non-attainable in the short run due to lack of available land, lack of access to a site, and wetlands impacts associated with nearly any site in the area around I-495, the Massachusetts Turnpike and the railroad tracks.

The MBTA operates 11 commuter rail lines with a total of 101 stations. From surveys, the MBTA has an excellent profile of existing ridership. Part of that profile is that riders typically drive 6 miles or less to a commuter rail station.

Given the profile of commuter rail users it became clear that more than three intermediate stops would be required to attract sufficient ridership to achieve a feasible operation.

In the final analysis, it was decided to locate a station in each of the communities through which the rail line passed and that these stations would be primarily local in character. An exception to this is the proposed Millbury station which is located to serve riders from the Massachusetts Turnpike and Route 20 to the west, residents from the City of Worcester to the north, and Millbury and smaller communities to the south.

In terms of the distribution of stations or distance between stations, there are no particular spacing criteria. Each station is seen as having its own zone of ridership attraction. A station with several hundred riders makes sense. A station that only adds a few riders is not worthwhile and will lengthen total trip time for all riders on the line. If one of the stations were eliminated, there would be shifting of ridership to other stations. Surveys of current riders show that they tend to travel toward Boston to pick up the station closest to Boston. The zone fare structure, based on travel distance, is certainly a factor in this behavior.

11.2 Candidate Sites - Worcester

Eight candidate station sites were evaluated in the City of Worcester, including five sites in the downtown area. While the terminus of the rail extension at a location in downtown Worcester was an assumption from the beginning of the project, potential station locations were investigated along the four mile segment of rail corridor between I-290 and the Millbury town line. None of the sites along the corridor was suitable for a Worcester terminal station. Development of both an intermediate station and terminal station in Worcester would have little benefit in terms of increased ridership and an additional station would adversely affect trip time. Ultimately, Union Station was favored over all sites in Worcester because of its value as an intermodal facility within a historically significant structure located in the downtown area.

Amtrak Station

This site, located adjacent to I-290 and across from Washington Square, is presently functioning as the Amtrak rail station. Configuration of the available land is such that a structure would be required to achieve adequate parking for long term use as the terminal station.

To satisfy both initial and future parking demands, it is proposed to use existing municipal parking lots located under the adjacent I-290 viaduct. The MBTA, through the Commonwealth of Massachusetts Division of Capital Planning and Operations, is currently negotiating an agreement with the City of Worcester for use of the lots for commuter rail parking.

This Amtrak site was selected as the interim service terminus because it is already a functioning rail facility. This site was not selected as the permanent terminus because City of Worcester officials believe a major intermodal facility at Union Station has the greatest promise for contributing to downtown Worcester revitalization.

Union Station

Union Station in Worcester and South Station in Boston are the only two remaining grand railroad stations built in Massachusetts. Built in 1911 to replace an earlier structure, Union Station has been placed on the National Register of Historic Places.

Although it currently is an abandoned and seriously decaying structure, City of Worcester officials believe that a restored Union Station holds great promise as an intermodal transportation facility. This site was studied by the MBTA based on the strong endorsement of City officials. The City of Worcester is now taking the lead in planning and design for the restoration of Union Station (EOEA #9521) as a project separate from Worcester Commuter Rail Extension.

Salem Street Municipal Parking Lot

The Salem Street site, initially evaluated in the 1990 Feasibility Study, is north of the railroad tracks and New Salem Street. The Feasibility Study suggested that a new rail station in this area would have a positive impact on neighboring land uses. This location also has several challenging aspects to overcome, including bridging over New Salem Street to connect the site to the elevated tracks. Reevaluated to see if it had better potential for serving downtown Worcester than either the Amtrak station or Union Station, it was concluded that this site had much less potential than Union Station.

Wyman-Gordan Site

Another site near downtown Worcester originally evaluated in the Feasibility Study but revisited in an attempt to find the best possible location for a terminus in downtown Worcester, the Wyman-Gordon site is an existing industrial area with large parking lots in a manufacturing zone. The site was eliminated from consideration because it is relatively isolated, and visibility and security would be difficult to achieve. All of the site is also in private ownership and would require a significant acquisition process.

Trailways Bus Site

Located north of the railroad tracks and New Salem Street on Madison Street, the Trailways site was originally evaluated in the Feasibility Study but looked at again because of its relation to downtown and the multimodal potential of the site. Grade differential between the railroad tracks and the site is a problem and the costs of acquiring this privately owned parcel and of clearing it would be significant.

Plantation Street/Biotech Park Site

This site was evaluated in response to suggestions from Worcester business representatives that a station to serve the Biotech Park/U. Mass Medical Facility would be highly desirable. The Plantation Street area has no open land and station development would require a significant amount of acquisition and demolition of existing structures. The site is located adjacent to the sharpest curve of the entire rail corridor. Additionally, the sharp curve occurs within a deep rock cut which would be very costly to widen in order to achieve a straight section of track required for the station platform. These major constraints eliminated this station site from consideration.

Sunderland Road/Atlas Street Site

A relatively open area accessed via Atlas Street off Sunderland Road in Worcester, this site is adjacent to a straight section of track and within walking distance of several residential streets.

Sunderland Road connects Route 122 and Route 20 and therefore access via major roads is adequate. But, immediate access is possible only via Atlas Street, a local street with approximately 10 single family houses. This site was not seriously considered because it is unsuitable for a terminal station. While the location may have attracted some riders as an intermediate station, the overall objective was to

propose a limited number of stations so as to keep the total travel time the shortest possible duration.

Route 122/Route 20 Sites

Four sites in the vicinity of the intersection of Route 20 and Route 122 were evaluated. The attractiveness of a station in this area was the excellent regional road access and visibility from both Routes 20 and Route 122.

The sites included two parcels to the east of the tracks and two parcels to the west of the tracks. All four parcels are located in commercial/industrial areas and would involve acquisition and dislocation of some business properties. A major problem for all four sites is the sharp curve of the rail tracks and the elevation of the trackbed, which is well above the adjacent property.

The City of Worcester did not support a station in this area and several City of Worcester staff believed a station at this location would weaken the case for a major Worcester terminal. Consideration of a site in this area was dropped with an eye to proposing only a minimum number of stations so that total trip time would not be increased.

11.3 Candidate Sites - Millbury

In its evaluation of Worcester Commuter Rail Service, the Feasibility Study did not propose a station stop in Millbury although a half mile length of rail corridor traverses the northernmost corner of town. Millbury Junction Station, opened in 1837, formerly was located in this area where a branch track left the Mainline and extended south to Millbury Center. Passenger service on the branch line was ended in 1932. Mainline stops were reduced to one train per day and discontinued altogether in 1944. The former station area is now overgrown. While the rails and ties were removed long ago, the location of the former Millbury Branch trackbed is still visible.

The idea of including a station in Millbury first came into focus when the MBTA was keenly interested in locating a regional station to intercept traffic to Boston eastbound on Route I-90. Efforts at finding an accessible site at the junction of I-90 and I-495 had not been successful as nearly all the surrounding land is wetlands and within an Area of Critical Environmental Concern (ACEC).

The Turnpike Exit #11 access road provides a direct connection to Route 122 only ¼ mile from the railroad tracks. Based on the success of the Exit 11 park and ride lot where Peter Pan Bus Lines picks up some 300 riders daily, there appeared to be good potential for a station in this area with parking for 700-1,000 vehicles. The Millbury Town Planner enthusiastically supported the concept of a commuter rail station and asked the MBTA to explore ways in which the Town could operate the commuter parking lot and collect the revenues.

Opposition to a Millbury site located on the south side of tracks and accessed from Route 122 began as soon as the MBTA formally presented its plan to the Town Selectmen. A local citizens committee was formed and the selectmen appointed leaders of the citizens group to the Millbury MBTA Advisory Committee. The Advisory Committee strongly opposed the Route 122 access and instead suggested a station site north of the tracks and accessed from Route 20 in Worcester. In deference to the Town of Millbury, the MBTA reduced the size of the parking area to 300 spaces and agreed to consider a station accessed from Route 20.

The Draft EIR will evaluate both potential station sites. The location of the station platforms is very similar for both alternatives. The major difference between the alternatives is that one provides parking north of the tracks accessed via Route 20 while the other provides parking south of the tracks accessed via Route 122, opposite the Mass Pike Exit No. 11.

11.4 Candidate Sites - Grafton

Several sites were evaluated in Grafton before concluding that the Pine Street location represented the best commuter rail site.

North Grafton - Route 140

For many years, commuters were served by a station in North Grafton located just east of Route 140 and north of Westborough Road. The site is marked by the location of a pedestrian tunnel crossing under the tracks. The Grafton and Upton Railroad connects to the mainline at the east end of this site.

Located in a mixed but predominantly residential area, the site is small and constrained by abutting residential uses and was judged to be insufficient in size to meet parking requirements adjacent to the platform.

Parmenter Crossing

The Feasibility Study evaluated a station stop in the vicinity of Parmenter Crossing north of Westborough Road. This site was revisited, but it was concluded that conflicts with neighboring residential uses and the grading differential between the tracks and the site presented problems that eliminated this area from further consideration.

Tufts University

Tufts University Veterinary School initially supported a station located immediately behind its Administration Building, and made a commitment to reserve necessary land (owned by the University) for the rail facility. This location was later eliminated when it became clear that much of the site was wetlands and that similar connections to Tufts facilities and the proposed bio-tech park could be achieved by a station at Pine Street.

Pine Street

This site is located off Westborough Road, north of the railroad and on the west side of Pine Street, where of a 100 acre parcel of land from the former Grafton State Hospital is proposed for development of a biotech park.

A commuter rail station and new Pine Street bridge would enhance the town's economic development of this parcel. A station in this location would also enhance the Tufts University Development Corporation's Technopolis project currently underway on a 200 acre parcel south of Westborough Road, but within walking distance of the rail station.

Town of Grafton officials strongly support commuter rail and specifically the Pine Street station site, where 5 acres of land owned by the Commonwealth of Massachusetts's Division of Capital Planning & Operations have been reserved for the commuter rail facility. Because of the available land and the support of the Town officials, the Pine Street location is considered the best of several sites in Grafton.

11.5 Candidate Sites - Westborough

The MBTA evaluated numerous sites for an intermediate station along the seven miles of rail corridor in Westborough, as well as conducting a careful search for a

regional station site near I-495. Concurrently, a citizens committee appointed by the Westborough Board of Selectmen conducted an independent search and evaluation of sites. While there was coordination between the MBTA and the citizens committee, each group also worked independently. Interestingly, both groups reached the same conclusions in evaluating potential station sites.

Regional Station Sites

Four sites near the junction of I-90 and I-495 were evaluated as potential regional stations—the Fruit Street location proposed in the Feasibility Study, the Cumberland Farms property (2 options) and the Conrail Auto Terminal facility. None was deemed appropriate to carry forward as a near-term proposal. While a regional station is still a long term goal, the MBTA decided to concentrate efforts on extension of service to Worcester and leave the detailed planning for a regional station for another project to be scheduled at a future date. A discussion of the regional station sites and analyses is presented in Section 17.

Intermediate Station Sites

Old Rail Station - East Main Street Site

Marked by an historically significant rail station building designed by H.H. Richardson, the station site is limited to a small area on a knoll and considerable site development and land acquisition would be required to construct a modern commuter rail facility with adequate parking. Adjacent land is commercial or industrial development and land acquisition costs would be high. The Citizens Committee was concerned about an increase in traffic on an already burdened East Main Street. The lack of available parking and high cost of developing the necessary parking made this site unworkable.

Route 135 Sites

One of the Route 135 sites is north of the railroad and would utilize vacant land between the tracks and Maynard Street on both the west and east side of Route 135. The other Route 135 site, identified by the Westborough MBTA Advisory Committee, is the Corrugated Paper complex south of the tracks and east of Route 135.

The site north of the tracks is vacant land, but the parking area would abut several residential properties on Maynard Street. Access to the site would also place additional traffic on both Maynard Street and Route 135 (Mill Street). The site is limited in size and some wetland areas were noted. Although located close to

residential areas that would provide some ridership, the site generally had more problems than potential.

The corrugated paper facility is on the south side of the tracks, but again is a relatively small site occupied by an operating business. The cost of the land taking and relocation and displacement of jobs precluded serious consideration of this site.

Smith Valve Parkway

This site was selected by both the Westborough MBTA Advisory Committee and the MBTA. Vacant and currently for sale, the site is located in a large industrial zone area about 1.5 miles from Route 9 and with good access via Otis Street. A residential area located south of the tracks is buffered somewhat by an existing embankment. Approximately 65% of the station traffic is anticipated to reach the station from Route 9 and Otis Street, resulting in little if any impact on the residential area south of the tracks.

11.6 Candidate Sites - Southborough

Although the rail corridor passes along the southern boundary of Southborough for a distance of less than two miles, historically station stops were provided at both Southville and Cordaville. The Southville area is currently built up to the extent that locating a new station there is not practical.

The Cordaville area, located north of the tracks at the intersection of Route 85 and Southville Road, was investigated during the Feasibility Study and dismissed because the site is small. When re-evaluated during the conceptual design phase, it was determined that land south of the tracks could augment the small site north of the tracks to provide a moderate sized station. The site is relatively isolated, but easily accessed by Route 85 from both the south and north. A Southborough station became very important when the large site in Ashland at Howe Street was judged unacceptable by the Town of Ashland. The Cordaville site is close to residents of Marlborough, Southborough and Hopkinton, communities with relatively high projected ridership.

11.7 Candidate Sites - Ashland

The Feasibility Study evaluated three potential commuter rail station sites in Ashland including locations in Ashland Center and Cherry Street/Megunko Road as well as the preferred Howe Street site. Subsequent re-evaluation of the Howe Street location during the schematic design phase determined it to be unsuitable and several other alternatives have been considered. Currently, two options are presented as possible station locations, each with parking to be provided both north and south of the tracks. These options are designated Ashland Station-East and Ashland Station-West. The east alternative is the preferred option; the west alternative will be pursued only if the east alternative proves to be infeasible.

Ashland Center

The Ashland Center site is marked by the historically significant station structure now converted to a business use. The old station building is south of the tracks and there is no land available for parking. North of the tracks, there is a public parking area with spaces for approximately one hundred vehicles. The MBTA owns a long linear adjacent parcel of land which, together with the public parking lot, could accommodate approximately 200 cars.

Commuter rail use of this site, however, would fill up the public lot and deny opportunities for business parking during the day. The parking capacity of the station would be limited to a size below what the MBTA desires and well below projected demand. Town of Ashland officials and the MBTA concluded that Ashland Center station would likely create a parking problem in the downtown area and that other sites held greater potential for the commuter rail station.

Cherry Street/Megunko Road

This site is located close to downtown Ashland in an older industrial area. Only a small area of the potential site is undeveloped and a reasonably sized station would require the taking of several industrial structures. Since this site has a history of hazardous materials contamination and access requires travel through residential areas, it was dropped from consideration.

Howe Street

The Howe Street site was recommended by the 1990 Feasibility Study, because of its relatively large size and apparent lack of incompatible land uses. Once the schematic design phase was initiated and the MBTA began to seriously consider this

site, a number of issues arose that led to a search for other sites. The Howe Street site is occupied by a medical products manufacturing facility and this acquisition would be very costly. Additionally, town officials and numerous residents were concerned about access from the south and along Southville Road. This site was eventually dropped in favor of the Pleasant Street location discussed below.

Pleasant Street

The Pleasant Street site, identified during the schematic design phase, is relatively close to downtown and has some open undeveloped land. The adjacent Latter Rain Church property has a sizable parking lot. Following up on a suggestion by the Ashland town planner, discussions were held with the church about joint use of the church parking lot, but did not prove fruitful. Two options for Pleasant Street were developed; one would take one commercial property and provide parking for 350 cars; the other would acquire two commercial properties and provide parking for 480 vehicles.

The Pleasant Street location, in either of the two size options, was the recommended site during the schematic design phase.

During the review of sites by the MBTA, the Ashland MBTA Rail Committee also conducted a review of nine sites. Four of the nine were the same alternatives discussed above; of the five additional sites identified by various members of the rail committee, none survived the first round of evaluations by the committee. The Ashland MBTA Rail Committee concluded that the Pleasant Street location was the best of the nine sites.

Subsequent to the identification of Pleasant Street as the favored site by both the MBTA and the Ashland MBTA Rail Committee, revised ridership figures prepared by CTPS showed that the majority of riders at an Ashland station would originate in Holliston and Ashland and travel through the center of town to reach the station.

Approximately 70% of the projected station patrons reside south of the railroad; to reach the proposed Pleasant Street site, these riders would be required to pass through the Main Street and Cherry Street grade crossings as well as adding traffic to the downtown street intersections. In an effort to minimize traffic impacts, a search was conducted for a site south of the tracks. Four additional station site alternatives were investigated that incorporated either a site entirely south of the railroad or provided parking capacity both north and south of the tracks in proportion to the origins of station patrons.

Pleasant Street/Nyanza (Site A)

This split site configuration proposed use of the same open parcel adjacent to the Latter Rain Church on Pleasant Street to provide approximately 200 spaces while also utilizing a portion of the Nyanza parcel to the south of the tracks to provide an additional 450 spaces. The proportion of the spaces, both north and south of the tracks, is well matched to the origins of projected riders so that little or no cross-town traffic would be required. The parcel south of the tracks, however, is a hazardous waste site and a portion of the site is also wetlands. Provision of south side parking requires construction of a new 4,000 foot long access roadway.

Ashland Station-East: Pleasant Street/Megunko Road (Site B)

This site is also a split configuration utilizing the vacant parcel on Pleasant Street and three industrial parcels south of the tracks on Megunko Road. A new access road 3,000 feet in length would connect the south side parking to Route 135.

This site avoids the wetlands issues noted in the Site A proposal. Some relocation of the industrial activities on Megunko Road would be required by this alternative.

Based on meetings with the Ashland MBTA Rail Committee, the MBTA has decided to carry this alternative forward as the favored site for more analysis as part of this Draft Environmental Impact Report.

Although this site is not located within the Nyanza Waste Site (Capped) area, it does lie immediately downgradient of the cap and partially within its groundwater plume. The U.S. Environmental Protection Agency (EPA) has divided the cleanup of the Nyanza superfund site into three phases. Phase II of the clean-up (currently under final design), includes the extraction and treatment of groundwater from the plume. Several meetings and various discussions have already taken place between the MBTA, DEP, and the EPA in efforts to define and identify impacts, coordination and potential liability/legal implications associated with locating a Commuter rail station over the plume area. Although the MBTA, DEP, EPA, and the Town of Ashland all agree that this site is the preferred alternative, final details (particularly the liability and legal issues) have yet to be confirmed. As a result the High Street/Split Configuration (Site D) and Pleasant Street/Megunko Road (Site B) alternatives will continue to be carried forward.

Megunko Road/Expanded (Site C)

This site represents an expansion of the parking capacity south of the tracks to accommodate 600 vehicles, requiring clearing of six industrial parcels. The site

would be reached by the same access road used in the preceding alternative. Parking on Pleasant Street north of the tracks would not be constructed; therefore some riders from the north would pass through the downtown area to reach the station.

This alternative, which requires more land takings and dislocation and does not have the flexibility of parking on both sides of the tracks, was judged to have less potential than Site B discussed above.

Ashland Station-West: High Street/Split Configuration (Site D)

This site uses a split configuration with parking both north and south of the tracks. Rather than the Pleasant Street site to the north of the tracks, an area off High Street involving a portion of the Burnham Restaurant parcel is proposed for a parking lot for 200 cars. Immediately south of the Burnham property and west of the Nyanza site there is open land that would accommodate 500 or more vehicles. Access to the south parking lot would require nearly one mile of new access road but would open up a large area for development. The split configuration eliminates the need for traffic to pass through downtown Ashland. This option looked promising. However, after a careful evaluation concluded that much of the area would be considered wetlands and site development would require a variance under the Wetlands Protection Act, no further analysis of this option will be done at this time.

11.8 Alternative Station Designs

The rail corridor for the Worcester commuter rail extension is owned and operated by Conrail and its use for commuter rail service will require negotiation of an operating agreement between Conrail and MBTA. (In contrast, most of the other commuter rail lines, including current service to Framingham, operate over rights-of-way owned by the MBTA, with operating rights for freight service retained by or granted to the seller as a condition of sale at the time the lines were purchased by the MBTA.)

As owner/operator, Conrail must carefully weigh concerns for the efficiency, safety and profitability of its own operations, as well as the needs of its freight customers, against the desires of the MBTA.

In the early design stages of the project, alternative concepts have been evaluated in an attempt to address and resolve operational issues and conflicts that would result from adding commuter rail trains and stations to an existing mainline freight corridor.

These issues relate to track configuration and more importantly to passenger platforms at proposed stations, where accessibility criteria conflict with freight clearance criteria.

Track Configuration

The present rail corridor is double tracked except for a 7 mile segment between milepost 33 in Westborough and milepost 40.3 in Worcester, where the southerly track has been removed. An adjoining 3 plus mile section of the southerly track in Worcester would require extensive upgrading prior to resumption of high speed operations.

An analysis of operating conditions for proposed commuter rail service, existing Amtrak service and existing and proposed freight service reveal that fully operational double track is necessary between Worcester and Framingham. The 7 mile gap will be reconstructed and the 3 mile section in Worcester rehabilitated to ensure safe and efficient operations without adversely affecting train schedules.

The possibility of dedicated tracks, where one track was used primarily for freight operations and the other track used for commuter rail was investigated but determined by Conrail to be operationally infeasible because of freight service requirements on both tracks.

At the present time, the Framingham service (31 trains per day) operates on a single track between CP3 and CP4 adjacent to Conrail's Beacon Park yard in Allston. This segment of track is recognized as a problem area in that breakdowns in train or signal equipment can result in delays. The increase in total commuter rail operations of eight trains per day for basic service to Worcester will not adversely affect existing operations. The MBTA is committed to providing a means of increasing capacity for this section of track, but a near-term solution is not proposed as part of this project.

Single Platform versus Double Platform

With a single platform, both inbound boarding and outbound disembarkments use the same platform. Single platform layouts are commonly used on MBTA commuter rail lines that run on only one track.

The 1990 Feasibility Study proposed that each of the commuter rail stations on the Worcester extension would provide parking facilities and a single low level platform on the north side of the railroad tracks. With only a single platform on the westbound (outbound) side of the double track, trains operating on the eastbound (inbound) side would be required to crossover to the westbound track for station

stops and then make a return crossover to the eastbound track to resume the inbound trip. The additional switching requirements for the added crossover tracks and the potential conflicts with trains operating on the opposite track make this station design unacceptable.

An alternative to the single platform on the north side of the tracks is to construct a single platform between the tracks. The required platform width would involve increasing track centerline spacing to 32'-6", versus the current standard of 14'-0". The construction impacts related to track relocation to achieve the required spacing for a center platform would be significant. Center platforms also present safety concerns, particularly on a high speed freight line.

The stations currently proposed will provide separate platforms, one on the north side of the tracks for westbound passengers and one on the south side for eastbound riders. This option eliminates the necessity for the additional crossovers and the potential conflicts between trains associated with the single platform design envisioned in the feasibility study. This option also avoids the extensive track reconstruction and safety issues related to a single, center platform.

Unless all passenger loading/unloading takes place on the track adjacent to the parking facilities, some cross-track movement is required. For safety reasons, particularly on a high speed freight line, at-grade pedestrian crossing of the tracks can not be permitted. Each proposed station will provide for an overhead pedestrian bridge to connect passenger platforms with parking facilities, and intertrack fencing will be installed through the station to discourage pedestrian crossings. Where site topography is favorable (such as at the Southborough station), a pedestrian underpass has been investigated as an alternative to the overpass.

Low Level Versus High Level Platforms

The Americans with Disabilities Act, recently enacted by Congress, requires that public facilities must accommodate the access needs of those with disabilities. In the Commonwealth, the Massachusetts Architectural Access Board (MAAB) regulations require that "at newly constructed stations serving commuter rail coaches, access shall be provided to all passengers and to all coaches of the train by means of a raised platform...". The MAAB enabling statute, MGL Chapter 22, Section 13A, provides for the possibility of variance from the MAAB regulations where compliance is "not feasible technologically" or "would result in excessive and unreasonable costs without substantial benefit to physically handicapped persons in a particular case".

Nearly all of the MBTA's current commuter rail station platforms are low level or ground level platforms which require passengers to climb the three to five steps of

the commuter rail coaches. At many of the low level platform stations, trains have been made accessible to the handicapped by construction of "mini-highs", i.e., 45 foot long raised platforms with wheelchair ramps.

Among the factors involved in selecting station sites was the consideration for locating stations along straight, or tangent, sections of track. For low level platforms (i.e., at the same elevation as the rails), this issue is of lesser importance. For high level platforms (i.e., at the same elevation as the floor of the rail coach), it is essential that the platform be located on a straight track to avoid the presence of a hazardous gap between edge of platform and the rail coach doorway that can occur on a curved track/platform design. Railroad design standards (common to MBTA, Conrail and Amtrak) preclude construction of raised platforms where track curvature exceeds a 1° 40′ curve.

The Feasibility Study, dated January, 1990, proposed construction of 45 foot long "mini-high" raised platforms at stations along the Worcester commuter rail extension. Subsequent to issuance of the Feasibility Study, the use of mini-high platforms on the Worcester extension to provide access for handicapped individuals was envisioned in a March, 1990 memorandum of understanding (MOU) between MBTA and the Massachusetts Architectural Access Board.

In consideration of the more recent MAAB regulations regarding accessibility at new stations, construction of full length raised platforms was evaluated. Of particular concern is the substantial difference between the horizontal track clearance requirement for Conrail freight operations on this line and the horizontal clearance required for commuter rail passenger platforms.

For low level platforms, the standard horizontal dimension of 5′-1" from centerline of track to edge of platform (8" above top of rail elevation) does not interfere with freight train operations. On this rail corridor a high level platform (typically 4′-0" above top of rail) with a standard 5′-7" horizontal clearance encroaches significantly into the 7′-3" horizontal clearance required for unimpeded movement of wide load freight trains.

Station design alternatives to address this issue evaluated construction of the high level platform offset to the 7′-3" dimension; the platform would be accessed by construction of gauntlet tracks through the station site. (Gauntlet tracks are parallel to the mainline track, but offset by the 1′-8" required to bring the passenger coaches along side the raised platform. The additional trackwork and signals necessary for gauntlet tracks at a station typically would cost 3 to 4 million dollars, depending on complexity of track geometrics in the vicinity of the station site. For the same reasons

cited earlier regarding cross-over tracks, Conrail determined that gauntlet track operations would be unacceptable.

Mini-high platforms can be designed and constructed so that the protruding edge may be manually retracted to provide the required wide load freight clearance. With the protruding edge lowered into position, the mini-high provides the necessary clearance for passenger coaches and standard freights.

Recommended Station Design

To date, there has been thorough evaluation and investigation of station design elements, including the number and location of platforms, high level and low level platforms and how the platform issues impact track configuration, train operations, and safety concerns. After careful review of the alternative designs in consultation with Conrail, the proposed station design includes the following elements:

- double tracks, spaced 14′-0" centerline to centerline.
- intertrack fencing to discourage pedestrian crossings at-grade.
- 800′ long, low-level platform on the north side of the tracks for westbound trains.
- 800′ long, low-level platform on the south side of the tracks for eastbound trains.
- Both platforms to include 45′ long, mini-high raised platform at westerly end for handicap access. Mini-high design to incorporate retractable edge to accommodate wide load freight movement.
- A grade separated structure for pedestrians to cross the tracks; typically an overhead bridge with ramps to accommodate handicap persons.

Incorporation of these elements into the proposed station design will address the operational and safety concerns expressed by Conrail. Satisfactory resolution of these issues is a prerequisite to successful completion of the operating rights agreement necessary for restoration of commuter rail service. For the reasons set forth in the preceding discussion, the MBTA proposes to provide access for handicapped individuals by constructing mini-high raised platforms, as was envisioned in the March, 1990 MOU between the MBTA and the MAAB.

SECTION 12.0 ENVIRONMENTAL IMPACTS—MILLBURY STATION

The Draft EIR evaluates potential environmental impacts of two station sites in Millbury, both proposing parking for 300 vehicles. The location of the station platforms is very similar for both alternatives. The major difference between the alternatives is that one provides parking south of the tracks accessed by a new roadway connecting to Route 122 opposite the Turnpike Exit 11 in Millbury, while the other alternative provides parking on the north side of the tracks accessed by a new road connecting to Route 20 in Worcester. Site plans for the station alternatives are shown on Figure 12.0-1 and 12.0-2.

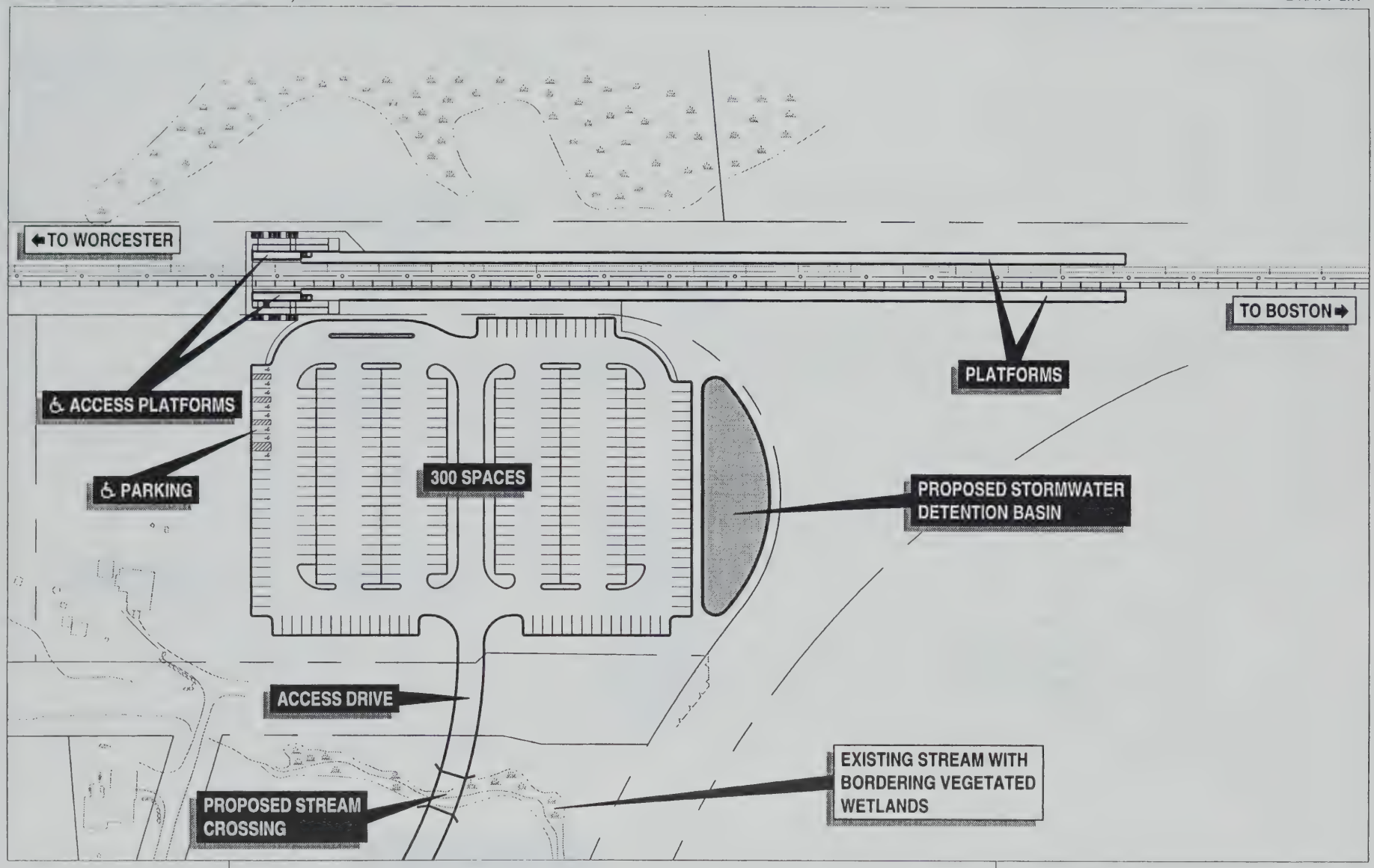
A Millbury station is projected to attract 149 patrons per day in 1996, with daily ridership increasing to 195 by the Year 2011.

The impacts of the Route 122 alternative can be summarized as follows:

- One residential property in Millbury will be acquired to allow for construction of the site access road.
- Reconstruction of the Route 122 - Exit 11 intersection will be required to restore level-of-service to acceptable conditions. Full mitigation would involve providing a double left turn lane from Exit 11 to Route 122 westbound, requiring right-of-way acquisition along Route 122 west of the intersection.
- During construction, some short-term noise and vibration impacts would occur at five residences. Project specifications will include mitigation measures for construction noise and vibration.
- One private well may be impacted. During final design, additional studies will address possible effects; if necessary, the well can be replaced or the property connected to the municipal supply.
- Stormwater management will include installation of catch basins with sumps and oil/grease traps. A detention pond will be constructed to mitigate increased runoff. During construction, a siltation control barrier will be employed to minimize effects of erosion and sedimentation.
- Access road construction will displace a small amount of wetland resources at a stream crossing.

The impacts of the Route 20 alternative can be summarized as follows:

- One business activity in Worcester will be acquired to allow for construction of the site access road.
- Stormwater management will include installation of catch basins with sumps and oil/grease traps. A detention pond will be constructed to mitigate increased runoff. During construction, a siltation control barrier will be employed to minimize effects of erosion and sedimentation.



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Approx. Scale: 1" = 125'

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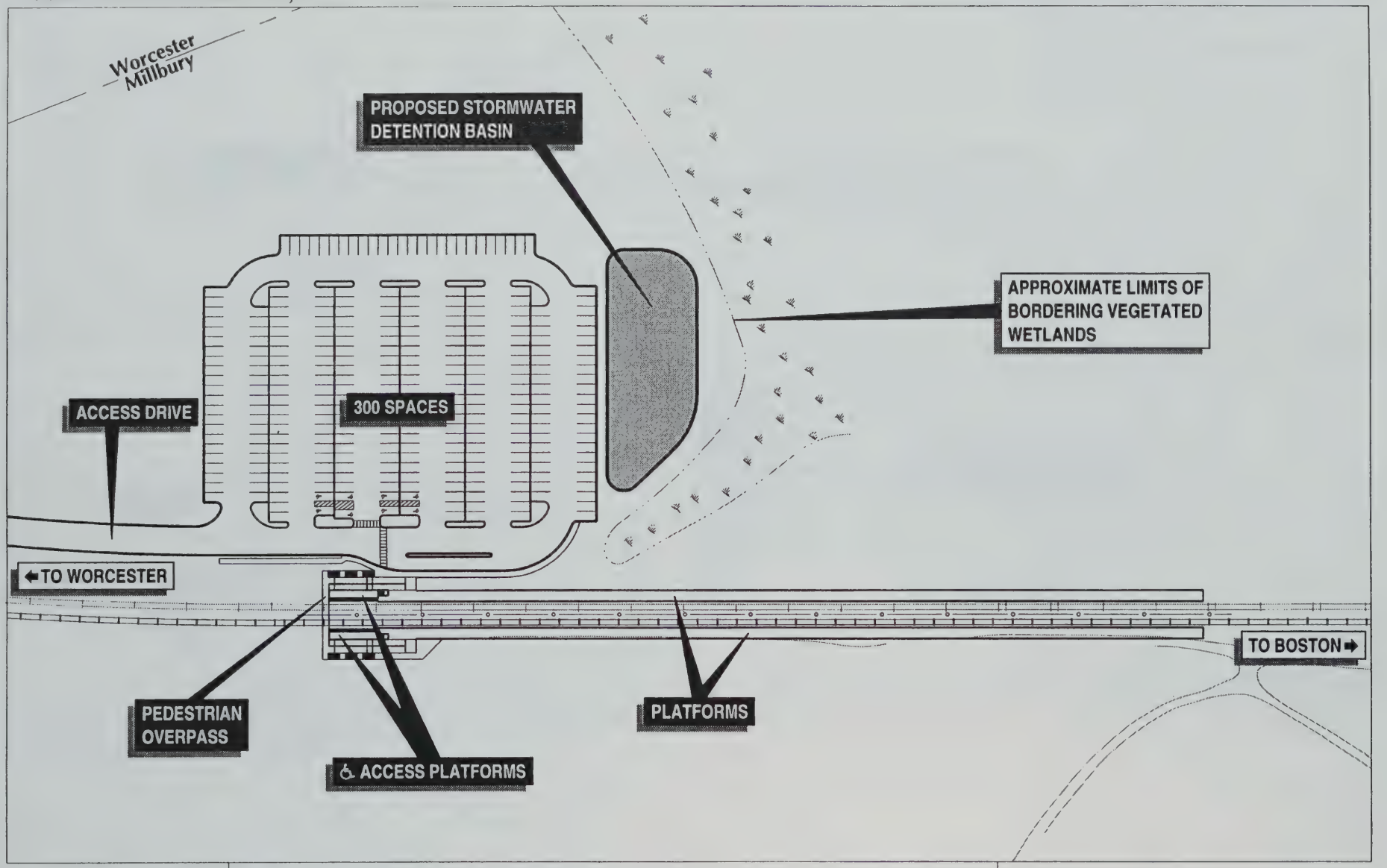
SITE PLAN
ROUTE 122 ALTERNATIVE
MILLBURY, MA

FIGURE 12.0-1



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SITE PLAN
ROUTE 20 ALTERNATIVE
MILLBURY, MA

FIGURE 12.0-2

MILLBURY STATION - Route 122

12.1 Local Traffic

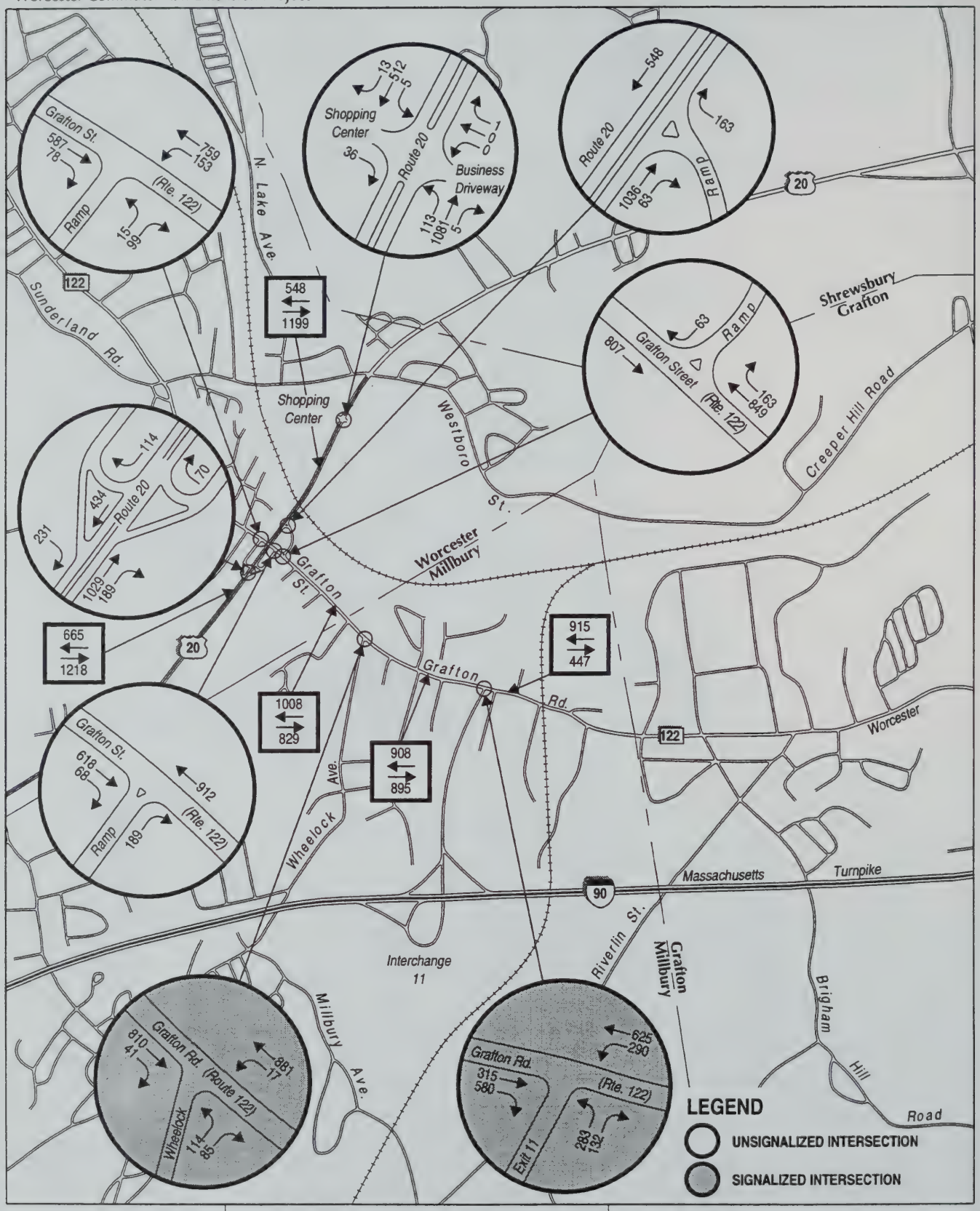
This section provides a summary of the complete traffic analysis included in Appendix, Volume I, Section 1. This section summarizes existing traffic conditions in Millbury, projected ridership for the Millbury Station and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Millbury Station focused on the streets and intersections identified in the Certificate of the Secretary of Environmental Affairs. Figures 12.1-1 (A.M. Peak Hour) and 12.1-2 (P.M. Peak Hour) show the location of the streets and intersections that were analyzed as part of the study.

Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection. A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours as well as the A.M. and P.M. peak generator hours. The A.M. and P.M. peak hours are those periods when traffic conditions are heaviest. The A.M. and P.M. peak generator hours are those periods when usage of the rail station is heaviest. Traffic count data showed that the A.M. and P.M. peak hours in Millbury are from 7:15 to 8:15 A.M. and 5:00 to 6:00 P.M., respectively. The A.M. and P.M. peak generator hours are from 6:45 to 7:45 A.M. and 6:00 to 7:00 P.M., respectively.



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Approx. Scale: 1" = 1750±

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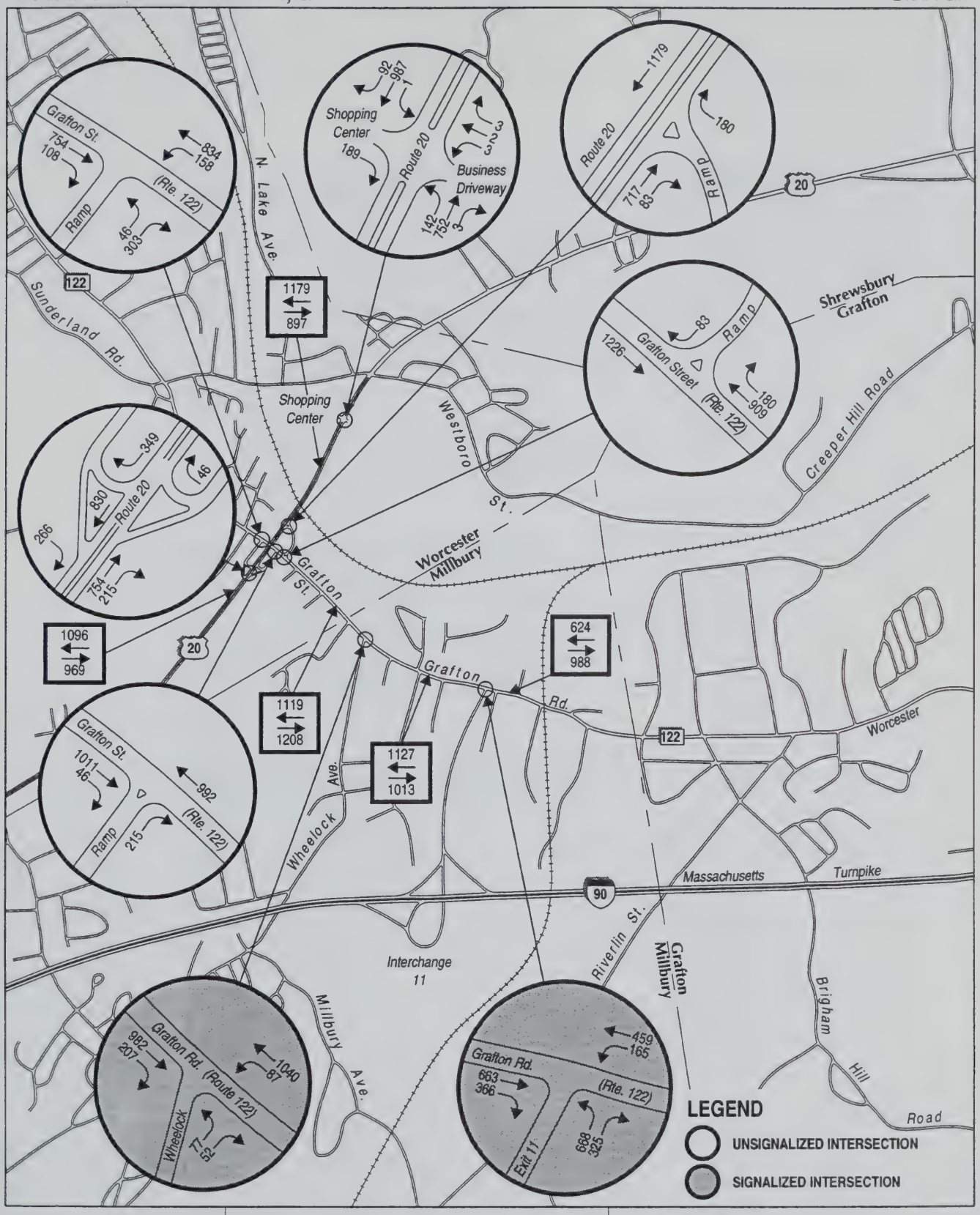
A.M. Peak Hour
7:15 - 8:15 A.M.
1992 Existing Conditions
Millbury Station - Route 122

FIGURE 12.1-1



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P.M. Peak Hour
5:00 - 6:00 P.M.
1992 Existing Conditions
Millbury Station - Route 122

FIGURE 12.1-2

Existing Conditions

Existing conditions were determined by traffic counts and intersection turning movement counts conducted in the Fall of 1992 and the Spring of 1993. The results of the counts were used to calculate existing condition levels of service for each of the intersections and street segments studied. Figures 12.1-1 and 12.1-2 show existing A.M. and P.M. peak hour volumes within the study area. Figure 12.1-3 shows existing Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

Table 12.1-1 shows the signalized intersection levels of service and Table 12.1-2 shows the unsignalized intersection levels of service. Roadway segment levels of service are shown in Table 12.1-3.

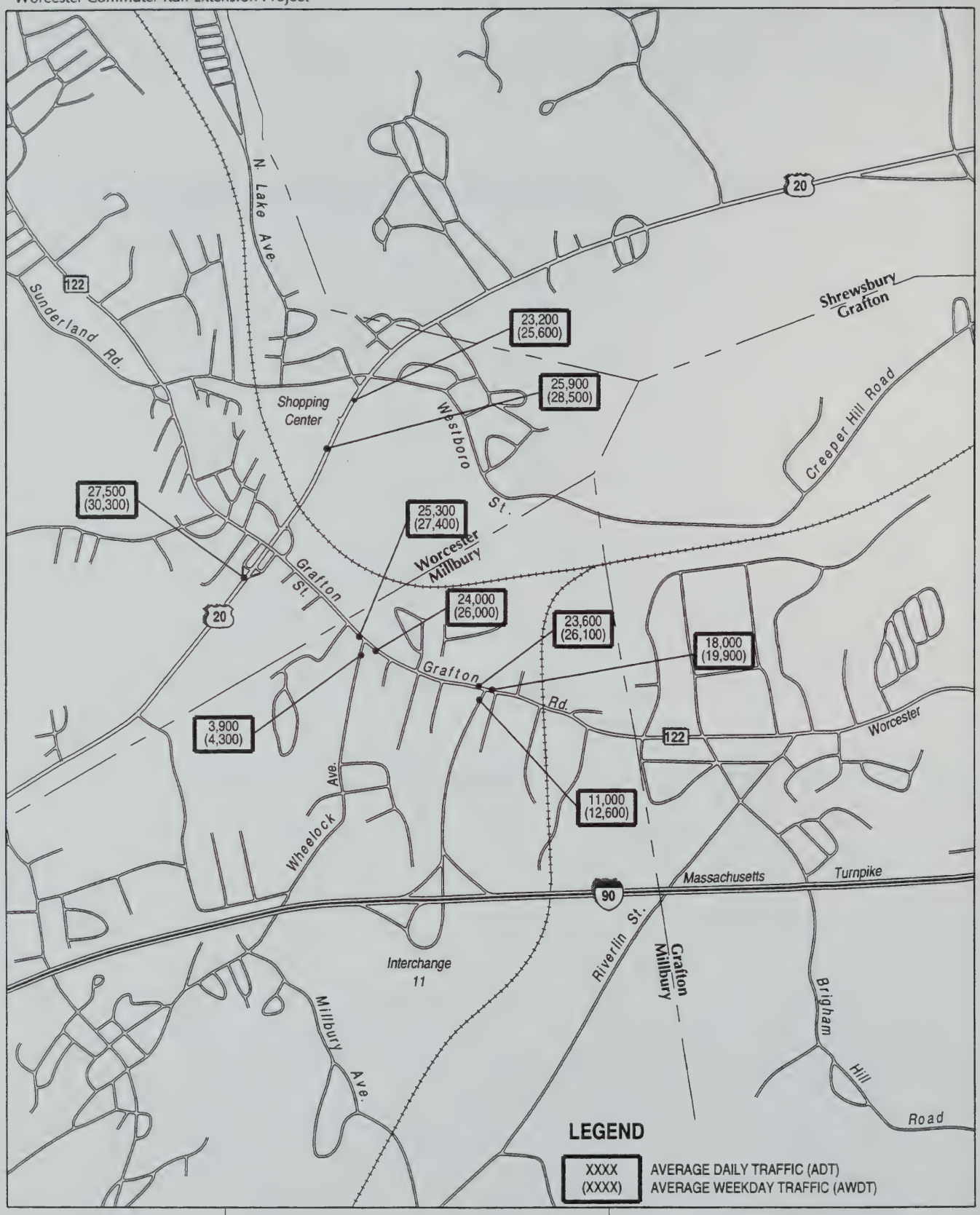
As shown in the tables, both the signalized and unsignalized intersections generally operate at acceptable levels of service in both the peak hours and peak generator hours. Traffic entering Grafton Street in Worcester from westbound Route 20 and traffic entering Route 20 from the existing truck business experience LOS F in the P.M. peak hour. Route 20 west of Route 122 functions at a low LOS E in the A.M. and P.M. peak hour, while Route 122 north of Exit 11 is at a low LOS E in the P.M. peak hours.

Table 12.1-1 1992 Existing Signalized Intersection Level of Service

Millbury (Route 122)	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Route 122 and Exit 11	B	D	B	B
Eastbound	A	C	A	B
Westbound	A	C	A	B
Northbound	B	E	B	B
Route 122 and Wheelock	A	B	A	A
Eastbound	A	A	A	A
Westbound	A	B	A	A
Northbound	B	B	B	B

Table 12.1-2 1992 Existing Unsignalized Intersection Level of Service

Millbury (Route 122)	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Grafton and Route 20 West				
LT from NB Grafton	B	C	A	A
LT and RT from Ramp	E	F	D	D
SB Grafton and Route 20 East				
RT from Ramp	C	E	B	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	A	C	A	B
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	B	A	A	A
Route 20 and Mall				
LT from EB Route 20	A	D	A	B
LT from WB Route 20	C	B	B	A
All from Truck Business	A	F	D	D
RT from Mall	A	B	A	A



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1992 Average Daily Traffic and 1992 Average Weekday Traffic Millbury, MA - Route 122

FIGURE 12.1-3

Table 12.1-3 1992 Existing Road Segment Level of Service

Millbury (Route 122)	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	A	A	A
WB Route 20 West of Mall	A	B	A	A

The Millbury Police Department was contacted on June 21, 1994 to determine the existence and location of any safety concerns or high accident locations. Chief Handfield indicated that no existing serious safety concerns or high accident locations currently exist within the MBTA study area in the Town of Millbury.

Rail Ridership Projections

Projections of rail ridership at each of the proposed stations of the Worcester Extension Project were prepared by the Central Transportation Planning Staff (CTPS) in May 1994. The full CTPS ridership projections memo is included in Volume II, Section 2.0 of the Appendix. Millbury Station is projected to attract a total of 149 daily round trip commuters in 1996. It is estimated that 12 daily commuters will be dropped off at the station and that the remaining 137 commuters will be Park'n'Ride patrons. Based on a vehicle occupancy rate of 1.12, the 137 Park'n'Ride patrons will result in a demand for 123 parking spaces.

The patrons of the Millbury Station are projected to originate from the towns of Auburn, Charlton, Millbury, Oxford, and the City Of Worcester. Table 12.1-4 shows the towns of origin and the projected ridership from each town for the year 1996 for the proposed Millbury Commuter Rail Station.

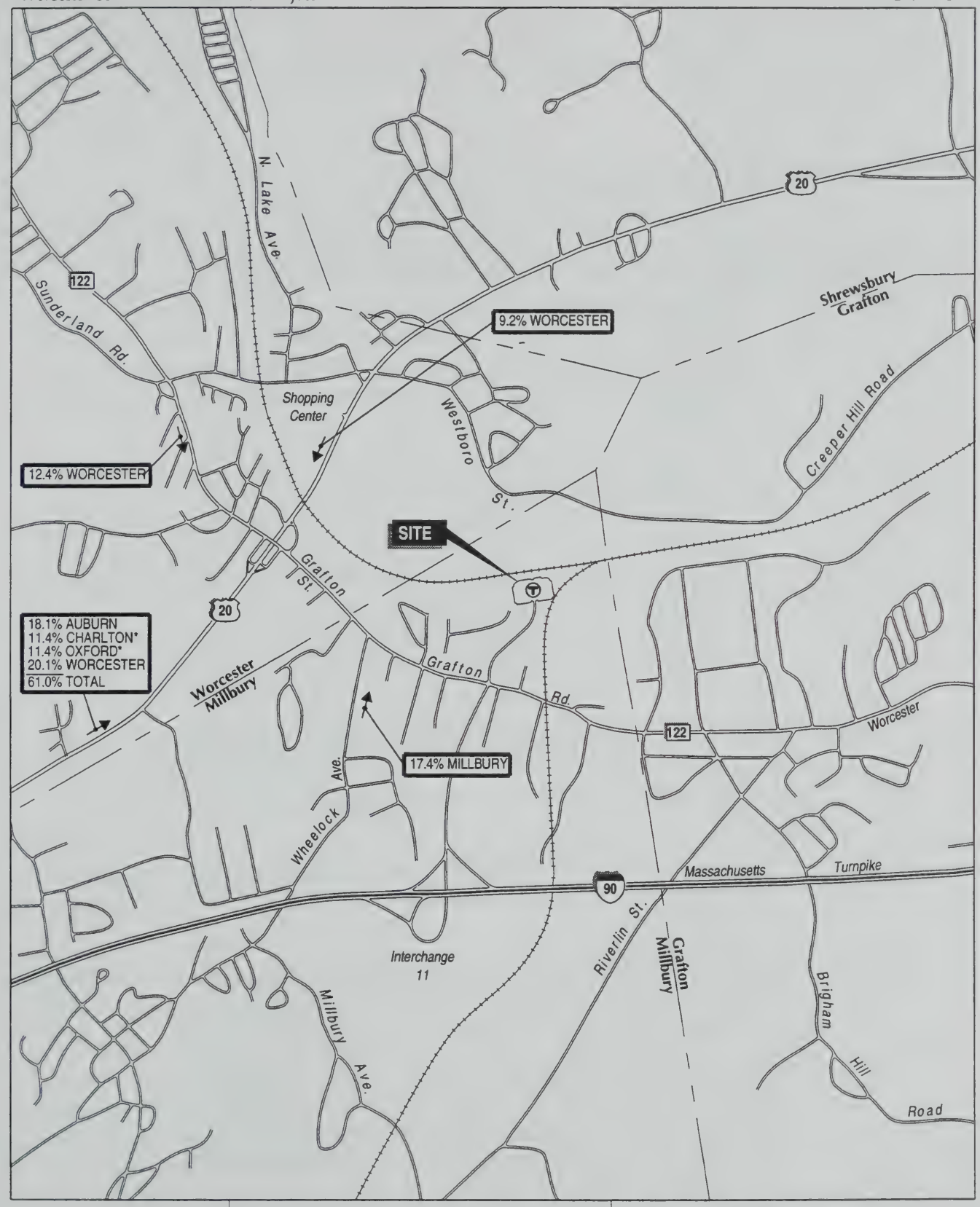
Table 12.1-4 Town of Origin Millbury Station (Route 122) Projected Ridership - Year 1996

Town	Riders
Millbury	26
Oxford	17
Charlton	17
Auburn	27
Worcester	62
TOTAL	**149**

The impact of the commuter rail riders on area streets as they travel to the Millbury Station is determined by assigning those commuters to a particular route within the study area. Patrons who live in Millbury essentially have two basic routes to access the station. These are Wheelock Avenue to Route 122 southbound or Route 20 eastbound to Route 122 southbound. The patrons who live in the City of Worcester will access the station by following routes: Sunderland Road to Route 20 westbound to Route 122 southbound, directly on Route 122 southbound or eastbound Route 20 to Route 122 southbound. The patrons from Auburn, Charlton, and Oxford are expected to use Route 20 eastbound to Route 122 southbound. Figure 12.1-4 shows the distribution and percentages of station related traffic that would use the Millbury area roadways.

Assignment of Riders to Trains

Commuter rail riders to the Millbury Station would arrive at the station to catch one of four A.M. peak period trains and would leave the station in the P.M. peak period based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several MBTA commuter rail lines. The observations of distribution by train tend to show the greatest number of riders on the trains arriving at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, the observations also show greater ridership in the middle of what is normally considered peak commuting period.



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Approx. Scale: 1" = 1750±

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Distribution of Commuter Rail Station Traffic
1996 BUILD ALL STATIONS
Millbury Station - Route 122

FIGURE 12.1-4

1996 Traffic Impacts

The 1996 traffic impacts must also consider background growth of traffic in addition to existing traffic volumes and the new riders destined for the station. Background growth is usually determined by tracking historical growth rates at permanent count locations. During the 1980's, traffic grew at rates of 2 - 3% or more a year in many areas. Data from a permanent count location in Millbury on Route 122 showed the most recent trend to be minus 0.1% per year (decreasing traffic volumes). As a conservative approach, a 0.5% annual growth in traffic volumes was assumed from 1992 to 1996.

The traffic volumes for both a "No Build" and "Build" alternative were prepared. Levels of service were calculated for both the A.M. and P.M. peak hours and peak generator hours. The 1996 "No Build" alternative allows for a comparison with the 1996 "Build" alternative to determine if the additional traffic to or from the proposed commuter rail station will adversely impact the road network within the study area. In developing the "Build" alternative traffic volumes the commuter rail patrons from Auburn, Millbury, and Worcester currently accessing the Mass Pike at Exit 11 are considered pass-by traffic and therefore are not considered as new traffic to the study area.

In Millbury the peak hour and peak generator hour overlap by 30 minutes in the A.M. period and do not overlap in the P.M. period. Both peak hours and peak generator hours were analyzed to determine the greatest impact to the roadway network.

Tables 12.1-5 through 12.1-8 present the results of the LOS analysis for the signalized and unsignalized intersections. The tables reflect both "No Build" and "Build" conditions.

As shown in the tables both signalized intersections operate acceptably in the 1996 "No Build" and "Build" condition. The northbound approach at Exit 11 will experience LOS F in the P.M. peak hour under the "Build" condition.

Generally, in both the "No Build" and "Build" conditions the unsignalized intersections are operating satisfactorily. As in the existing condition traffic egressing westbound Route 20 to Grafton Street in Worcester and traffic egressing the truck business to Route 20 operate at LOS F in the P.M. peak hour. This occurs in both the "No Build" and "Build" conditions.

Tables 12.1-9 and 12.1-10 show the results of the road segment LOS analysis for the peak hours and peak generator hours.

As shown, the road segments are at LOS E or better in both the "No Build" and "Build" conditions. Route 20 west of Route 122 operates at a low LOS E.

Table 12.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	B	B	A	B
Eastbound	A	B	A	B
Westbound	A	B	A	B
Northbound	B	C	B	C
Southbound	-	C	-	B
Route 122 and Wheelock	A	A	A	A
Eastbound	A	A	A	A
Westbound	A	A	A	A
Northbound	B	B	B	C

Table 12.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	D	E	B	B
Eastbound	C	E	B	B
Westbound	D	D	B	B
Northbound	E	F	B	C
Southbound	-	E	-	D
Route 122 and Wheelock	B	B	A	A
Eastbound	A	A	A	A
Westbound	B	B	A	A
Northbound	D	D	C	C

Table 12.1-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	B	B	B	B
LT and RT from Ramp	E	E	D	D
SB Grafton and Route 20 East				
RT from Ramp	C	C	C	C
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	A	A	A	A
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	B	B	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	B	B	A	A
Route 20 and Mall				
LT from EB Route 20	A	A	A	A
LT from WB Route 20	C	C	C	C
All from Truck Business	A	A	D	D
RT from Mall	A	A	A	A

Table 12.1-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	C	C	A	A
LT and RT from Ramp	F	F	D	D
SB Grafton and Route 20 East				
RT from Ramp	E	E	B	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	C	D	B	B
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	A	A	A	A
Route 20 and Mall				
LT from EB Route 20	D	D	B	B
LT from WB Route 20	B	B	A	A
All from Truck Business	F	F	D	D
RT from Mall	C	C	A	A

Table 12.1-9 1996 Road Segment Level of Service - A.M. Peak Hours

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	B	A	A
WB Route 20 West of Mall	A	A	A	A

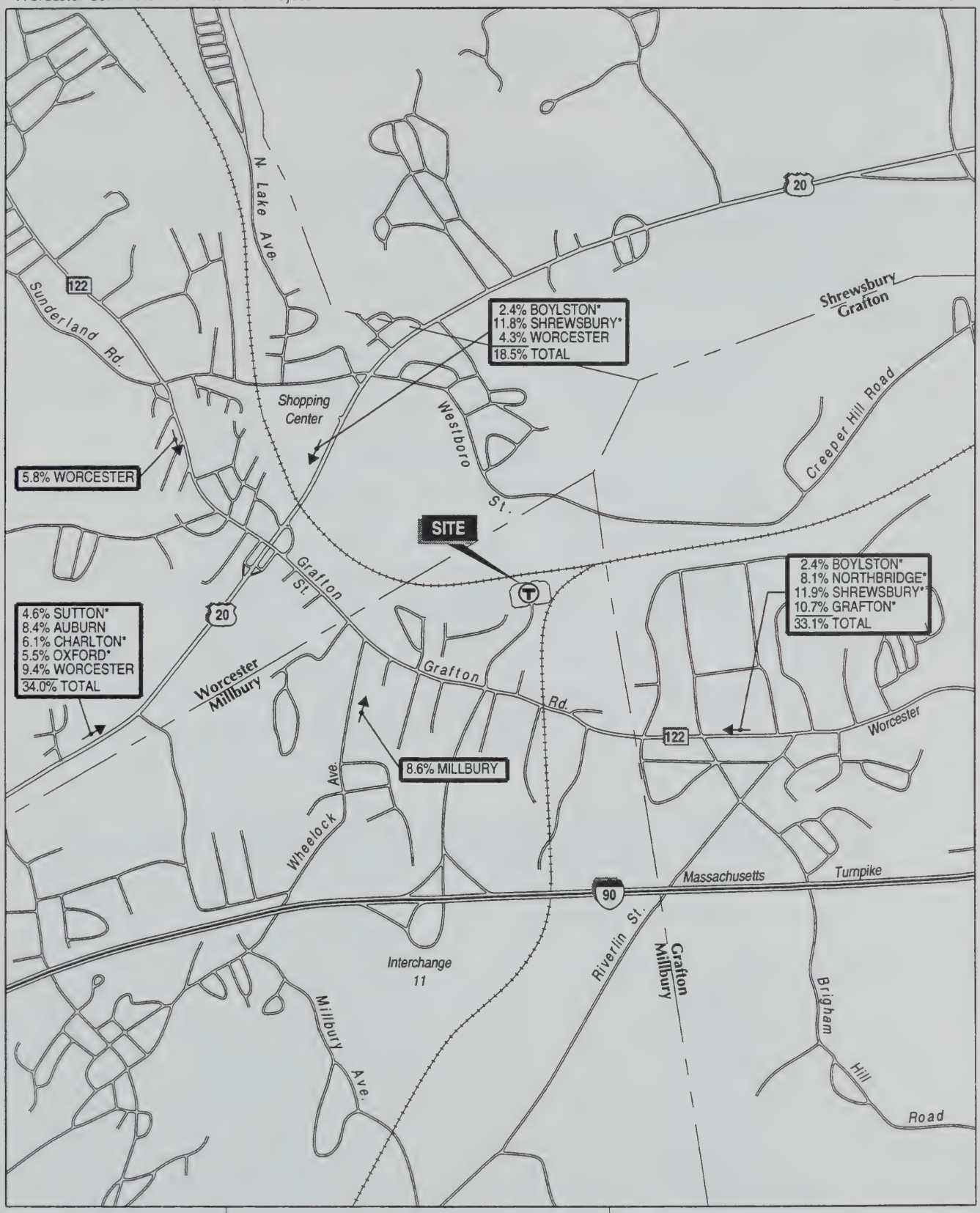
Table 12.1-10 1996 Road Segment Level of Service - P.M. Peak Hours

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	A	A	A	A
WB Route 20 West of Mall	B	B	A	A

1996 Traffic Impacts - Millbury Station Only

In order to address an upper limit, worst case situation with regard to traffic impacts on Millbury streets, an analysis was performed which considered that the Millbury commuter station was the only commuter station built by 1996 (in addition to a Worcester Station).

CTPS projected that under this scenario the Millbury Station would attract 347 daily round trip commuters, 319 of which would be Park'n'Ride patrons. Site traffic was distributed over the roadway network in a manner similar to that used for the 1996 "Build All Stations" scenario. The projected distribution of traffic is shown in Figure 12.1-5.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

0 1750

Distribution of Commuter Rail Station Traffic
1996 BUILD Millbury Only
Millbury Station - Route 122

FIGURE 12.1-5

A LOS analysis was performed for the peak hour and peak generator hour "Build" condition. The "No Build" condition is the same as previously presented in the "Build All Stations" scenario.

The results of the LOS analysis for the signalized and unsignalized intersections is shown in Tables 12.1-11 through 12.1-14.

Both signalized intersections will operate at overall acceptable levels of service in the "No Build" and "Build" conditions. There will be some reduction in LOS at both intersections in the peak period "Build" condition.

The unsignalized intersections for the most part operate satisfactorily in both the "No Build" and "Build" conditions. As the tables indicate, several movements would experience some reduction in LOS in both the "No Build" and the "Build" conditions. For example, as in the existing condition, the turning movement from westbound Route 20 to Grafton Street in Worcester and the movement from the truck business driveway to Route 20 will operate at LOS F in the P.M. peak period.

Tables 12.1-15 and 12.1-16 list the findings of the analysis of the road segments.

The road segments are functioning at LOS E or better for both "No Build" and "Build" conditions. Route 20 west of Route 122 operates at a low LOS E during the peak periods, while Route 122 south of Exit 11 has a minor reduction in LOS in the A.M. generator hour.

Table 12.1-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only)

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	B	B	A	B
Eastbound	A	B	A	B
Westbound	A	B	A	B
Northbound	B	C	B	C
Southbound	-	C	-	C
Route 122 and Wheelock	A	B	A	B
Eastbound	A	B	A	B
Westbound	A	B	A	A
Northbound	B	C	B	C

Table 12.1-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only)

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	D	E	B	C
Eastbound	C	E	B	D
Westbound	D	D	B	B
Northbound	E	F	B	D
Southbound	-	F	-	E
Route 122 and Wheelock	B	D	A	B
Eastbound	A	D	A	A
Westbound	B	B	A	C
Northbound	D	E	C	C

Table 12.1-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only)

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	B	B	B	B
LT and RT from Ramp	E	E	D	D
SB Grafton and Route 20 East				
RT from Ramp	C	C	C	C
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	A	A	A	A
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	B	B	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	B	B	A	A
Route 20 and Mall				
LT from EB Route 20	A	B	A	A
LT from WB Route 20	C	C	C	C
All from Truck Business	A	A	D	E
RT from Mall	A	A	A	A

Table 12.1-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only)

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	C	C	A	A
LT and RT from Ramp	F	F	D	D
SB Grafton and Route 20 East				
RT from Ramp	E	E	B	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	C	D	B	B
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	A	A	A	A
Route 20 and Mall				
LT from EB Route 20	D	D	B	C
LT from WB Route 20	B	B	A	A
All from Truck Business	F	F	D	E
RT from Mall	C	C	A	A

Table 12.1-15 1996 Road Segment Level of Service - A.M. Peak Hours (Millbury Station Only)

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	E
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	B	A	A
WB Route 20 West of Mall	A	A	A	A

Table 12.1-16 1996 Road Segment Level of Service - P.M. Peak Hours (Millbury Station Only)

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	A	A	A	A
WB Route 20 West of Mall	B	B	A	A

2001 Traffic Impacts

The level of service analysis was conducted for the Millbury Station study area using year 2001 "No Build" and "Build" traffic volumes. To account for normal background traffic growth, an annual growth factor of 1.5% was applied to the 1996 "No Build" volumes to develop the 2001 "No Build" volumes.

CTPS projected that the Millbury Station would attract a total of 162 daily round trip commuters to Boston. It projected that 149 of the commuters would be Park'n'Ride patrons. Projected percentage distribution of traffic is essentially the same as shown in Figure 12.1-4.

The LOS analysis was conducted for both the peak hour and peak generator hour "No Build" and "Build" condition.

The results of the LOS analysis for the signalized and unsignalized intersections are presented in Tables 12.1-17 through 12.1-20.

The analysis indicates that the signalized intersection of Route 122 and Exit 11 will experience LOS F conditions in the P.M. peak hour "No Build" and "Build" conditions. Minor reductions in level of service also occur in the peak generator hours.

While several unsignalized intersection movements will experience some reduction in LOS in the "Build" condition, most will continue to function at acceptable levels. As in the previous analyses, failure conditions exist in the P.M. peak hour under both

the "No Build" and "Build" conditions for traffic turning from westbound Route 20 to Grafton Street in Worcester and traffic egressing the truck business onto Route 20.

Tables 12.1-21 and 12.1-22 present the road segment LOS results.

All segments will function at LOS E or better under both the "No Build" and "Build" conditions. As in the existing condition and the 1996 condition analyses Route 20 west of Route 122 will operate at a low LOS E. A reduction in capacity due to normal background traffic growth will cause Route 122 north of Exit 11 and Route 122 north of Wheelock to experience a low LOS E in the peak periods. This will occur with or without construction of a commuter rail station.

Table 12.1-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	B	B	A	B
Eastbound	A	B	A	B
Westbound	B	B	A	B
Northbound	B	C	B	C
Southbound	-	C	-	B
Route 122 and Wheelock	A	A	A	A
Eastbound	A	A	A	A
Westbound	A	A	A	A
Northbound	B	B	B	C

Table 12.1-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	F	F	B	C
Eastbound	C	F	B	C
Westbound	F	E	B	B
Northbound	F	F	B	C
Southbound	-	E	-	D
Route 122 and Wheelock	B	B	A	A
Eastbound	A	A	A	A
Westbound	C	C	A	A
Northbound	E	E	C	C

Table 12.1-19 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Millbury and Route 20 West				
LT from NB Millbury	B	B	B	B
LT and RT from Ramp	E	E	D	E
SB Millbury and Route 20 East				
RT from Ramp	C	C	C	C
NB Millbury and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Millbury				
RT from Ramp to WB 20	A	A	A	A
EB Route 20 and SB Millbury				
RT from Ramp to EB 20	B	B	A	A
EB Route 20 and NB Millbury				
RT from Ramp to EB 20	C	C	B	B
Route 20 and Mall				
LT from EB Route 20	B	B	A	A
LT from WB Route 20	D	D	C	C
All from Truck Business	A	A	E	E
RT from Mall	A	A	A	A

Table 12.1-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Millbury and Route 20 West				
LT from NB Millbury	C	D	B	B
LT and RT from Ramp	F	F	E	E
SB Millbury and Route 20 East				
RT from Ramp	E	E	B	B
NB Millbury and Route 20 East				
RT from Ramp	D	D	B	C
WB Route 20 and Millbury				
RT from Ramp to WB 20	D	D	B	B
EB Route 20 and SB Millbury				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Millbury				
RT from Ramp to EB 20	B	B	A	A
Route 20 and Mall				
LT from EB Route 20	E	E	C	C
LT from WB Route 20	B	B	A	A
All from Truck Business	F	F	E	E
RT from Mall	C	C	A	A

Table 12.1-21 2001 Road Segment Level of Service - A.M. Peak Hours

Millbury (Route 122)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	E	E
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	B	B	B
WB Route 20 West of Mall	A	A	A	A

Table 12.1-22 2001 Road Segment Level of Service - P.M. Peak Hours

Millbury (Route 122)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	A	A	A	A
WB Route 20 West of Mall	B	B	A	A

Summary of Findings

The analysis indicates that traffic generated by the proposed commuter rail station on Route 122 would not impact level of service significantly at any of the locations within the study area. Much of the traffic that would use the commuter rail station is existing traffic already utilizing the roads to access the Turnpike at Exit 11. This reduces the amount of new traffic introduced to the road network.

Currently, the turning movements at the ramp from westbound Route 20 to Grafton Street in Worcester operate at unacceptable levels. This situation is due to the substandard design of the interchange and will continue with or without construction of a rail station.

Improvements to the Route 122/Exit 11 intersection, proposed as part of the Millbury Station Route 122 alternative, would include new phasing and timing for the traffic signal as well as the addition of an exclusive left turn lane for eastbound Route 122 traffic. These improvements are listed in Section 12.12, Proposed Mitigation and Mitigation Options.

In summary, while general improvements to increase capacity are warranted on both Route 122 and Route 20 to accommodate existing traffic volumes, the additional traffic generated by the proposed commuter rail station will not adversely impact the operating characteristics of the roadways.

12.2 Air Quality

Carbon monoxide (CO) is a colorless, odorless gas produced by the incomplete combustion of motor vehicle fuels. When combined with hemoglobin in the blood, it reduces the ability of the blood to carry oxygen. When people are exposed to increased CO levels, they may suffer headaches, nausea, a reduction in work rates and an increase in response time to stimuli. Extremely high concentrations can be fatal. In accordance with accepted practice, CO is the pollutant which is to be analyzed for public health effects at the microscale level. The U.S. Environmental Protection Agency (EPA) and the Massachusetts DEP have established air quality standards for CO to protect the public health and welfare. The CO standards are 35 ppm (parts per million) for the maximum 1-hour period and 9 ppm for the maximum 8-hour average. Both standards are not to be exceeded more than once per year. Carbon monoxide concentrations generally correlate well with traffic volumes.

Employing worst case traffic and meteorological conditions, a microscale analysis was performed to address the 1-hour and 8-hour standards at receptors adjacent to signalized intersections in each proposed station community. The "Build" versus the "No Build" situations were addressed for the year 1996 only since by year 2001 emissions are less due to a relatively small increase in traffic being more than offset by improved emission controls on most vehicles. The local air quality impacts are addressed at signalized intersections (existing or proposed) which have the greatest potential for CO impacts. Non signalized intersections generally are of lesser concern for air quality impacts, since the queued traffic and acceleration/deceleration functions primarily affect only the lower traffic volumes on the cross street.

Emission rates were generated using the EPA's Mobile 5a Emission model based on Massachusetts input files provided by the DEP in July 1994. The analysis was conducted using EPA's CAL3QHC program. The program predicts CO concentrations for receptors up to 150 meters from the roadway source. Peak A.M. traffic data were used for the predictions.

Due to a lack of site specific CO levels, background levels of CO have been estimated conservatively at 3 ppm for the 1-hour period and 2 ppm for the average 8-hour period. The background levels are consistent with those normally used by the DEP in suburban or urban areas.

Additional information on the air quality analyses is contained in Appendix Volume II, Section 6.0.

Employing the rationale and methodology described above, the intersection of Route 122 with Massachusetts Turnpike Exit 11 was selected for analysis. The intersection exhibits the traffic volumes and queued traffic which were determined to produce the highest CO concentrations (see Figure 12.1-1).

In order to simulate the highest CO concentrations, receptor locations were established along the sidewalk northerly of the intersection, approximately 50 feet east and west of the traffic signals. The results for year 1996 are as follows in Table 12.2-1.

Table 12.2-1 1996 CO Concentrations - Route 122/Exit 11 Intersection, Millbury

	1-Hour CO (ppm)		8-Hour CO (ppm)	
	No Build	Build	No Build	Build
Northeast Sidewalk	5.8	6.7	4.1	4.7
Northwest Sidewalk	5.2	5.6	3.6	3.9

Although the predicted concentrations are slightly higher for the "Build" versus the "No Build" condition, all values are well below the 35 ppm for the 1-hour standard and 9 ppm for the 8-hour standard. Additional receptors evaluated included 3 single-family residences and the Liberty Heights Bar, all located northerly of the sidewalk locations evaluated. The predicted concentrations for the 1-hour case range from 3.6 ppm for "No Build" to 4.2 ppm for the "Build" condition. Similarly the 8-hour values range from 2.5 ppm to 2.9 ppm. There are no other intersections affected by station generated traffic that would exhibit higher CO concentrations.

12.3 Noise and Vibration

Noise Impact Analysis Methodology

Because of slow train speeds near stations, the potential for noise and vibration impacts from train operations are at a minimum compared to other segments of the right-of-way. There is, however, the potential for noise and vibration effects near the station because of project-induced traffic on roads leading to and from station areas, as well as short-term effects during construction of platforms, parking, and other site facilities.

Traffic Noise

The significance of noise impacts from project-generated traffic near proposed commuter rail stations along the corridor was assessed based on the projected noise increase relative to the noise from existing traffic on applicable roads. Because the greatest changes in traffic volumes are expected to occur during peak commuting periods, the noise increase was evaluated in terms of the peak-hour L_{eq}.

Criteria for traffic noise impact are based on existing FTA guidelines, which state that a noise level increase of greater than 5 dBA is considered to represent impact. The existing FTA criteria are used here rather than the proposed FTA criteria used in the train noise assessment because of the general, non-site specific nature of the traffic noise impact assessment. Where the existing layout of major roads will essentially remain the same, the traffic noise assessment predicts only the change in noise resulting from the projected change in traffic volumes near the stations, and not the absolute traffic noise levels at specific noise-sensitive locations in the community.

The traffic noise analysis was carried out on a relative basis, by estimating the change in peak-hour traffic noise, which is a function of the change in peak-hour traffic volume. The assumption is that all other non-project related noise sources remain unchanged.

Construction Noise and Vibration

The construction of a fixed facility such as a commuter rail station is expected to include clearing, excavation, foundation work, equipment installation, paving and finishing. Construction machinery is likely to include the types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes and trucks. Construction will typically occur during 8 to 10 hour weekday, daytime periods.

Construction of the station can be categorized in two distinct operations—parking lots and platform areas—with total duration of construction estimated to be approximately eight months.

For a typical station site, the distance to significant noise impact was estimated to be 200 feet measured from the closest area of construction. In cases where noise-sensitive land uses were concentrated in a location very close to either the platform area or the parking area, separate screening distances were used to assess the two construction scenarios.

Station construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Usage factors were assigned to each piece of equipment to determine a cumulative reference noise level to use in determining the width of the noise impact zone.

Noise impact criteria for construction are based on the outdoor Annual Average Day-Night Equivalent Sound Level (AA L_{dn}), with a threshold of 65 AA L_{dn} defining the impact zone. This metric is slightly less conservative than the 24-hour L_{dn} used for train noise impact, given the short-term nature of construction noise impact. (A complete definition of metrics and terms pertaining to noise and vibration used in this report is given in Appendix Volume II, Section 3.)

The impact criteria for construction vibration are essentially the same as for train operations, except that impact is assessed only when the activity will occur for 30 days or more at a given location. Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990) . Vibration projections were made for the main equipment categories, based on the relative amount of energy imparted to the ground. Details on this methodology are given in the Appendix. A screening distance of 85 ft measured from nearest area of construction was estimated for vibration impact from general construction activity at stations.

Traffic Noise Impacts

The proposed layout of Millbury Station includes an access road which will bring traffic from Route 122 to the station via a residential neighborhood. For these receptors it was necessary to estimate the future peak-hour L_{eq} based on a projected peak-hour traffic volume, and compare it to the background L_{eq} during the peak hour (minus the contribution from trains). This is a principle similar to using the increase in traffic volume to estimate the increase in noise, except that in this case the existing traffic volume is zero and the comparison is made with the ambient level.

For residences located on Wildwood Road and President Road, local traffic is not a dominant source of noise and the existing background L_{eq} during the peak hour was measured to be about 50 dBA. The contribution to this ambient level due to the addition of access road traffic was estimated to increase this level by only 1 to 2 dBA. These homes, therefore, would not be exposed to noise impact from project traffic.

For residences located on Grafton Road (Route 122),the existing traffic noise is already relatively high, in the range of 60 to 65 dBA during the peak hour. The projected peak hour traffic volume on this road is estimated to increase by a factor

of about 1.02, resulting in only a fraction of a decibel increase in noise level. In addition, the introduction of the access road is not projected to cause a measurable increase in noise for homes located near its intersection with Route 122, particularly given that the existing levels are already quite high. Therefore, no significant noise impact is expected from project-induced traffic increases and/or modifications near the Millbury Station site.

Construction Noise and Vibration Impacts

During construction of the Millbury Station Route 122 alternative some short-term noise and vibration impacts would occur at 5 residences located on Wildwood Road and President Road.

Traffic Noise Mitigation

No significant traffic noise impact was identified for the Millbury Station Route 122 alternative.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures can be implemented:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers, and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

During the project design phase, specific construction noise limits will be developed and incorporated into the contract specifications, along with requirements for noise monitoring to certify compliance with the specified limits.

All of the potential vibration impacts from construction identified are related to annoyance effects and not to building damage effects, and will occur only during daytime hours. Following are some procedures that can be used to minimize the potential for annoyance from construction vibration:

- Restrict procedures that contractors can use in vibration-sensitive areas, and specify alternative techniques that generate lower vibration levels. For example, using the cast-in-drilled-hole piling method instead of impact pile driving would help reduce vibration levels from piling.
- Restrict the hours of vibration-intensive activities and the use of heavy-duty equipment to weekdays during daytime hours.
- Require vibration monitoring during vibration-intensive activities, especially blasting.

12.4 Site Drainage

The site of the proposed Millbury Station - Route 122 alternative is located in the northerly corner of the Town of Millbury just south of the railroad tracks and lies within the Blackstone River Watershed. The area adjacent to the tracks is open space consisting of grasses and gravel footpaths while the remaining area is vegetated with various trees and shrubs. The site will be accessed by a new approximately 1,200 foot long access road beginning at Route 122 directly opposite the ramp terminus from the Massachusetts Turnpike at exit 11. The access road extends in a northerly direction and crosses a stream at a point approximately 150 feet south of the parking lot (wetland Area 2 in Figure 7.4-2). The stream bed is approximately ten feet wide with sideslopes ranging from two horizontal to one vertical to a more gradual slope of eight horizontal to one vertical. Most of the project site area currently drains to this stream.

A Best Management Practices (BMP) plan will include a regular parking lot sweeping program, catch basins equipped with sumps and oil and grease traps, and the installation and maintenance of a siltation control barrier during construction. One objective of a sweeping maintenance program is to remove as many contaminants as possible from the parking lot surfaces before they are washed into the stormwater collection system. Studies have determined that a large percentage of contaminant loads are bound to particulates (silt and sand particles) and thus a regular sweeping program will be effective in reducing pollutant loads and improving runoff water quality. Cleaning of catch basins will remove additional coarse sediment and large debris from the stormdrain system. The general maintenance program for the station will also include removal of trash and organic debris (leaves, branches, etc.). This

will reduce not only loadings of nutrient related contaminants, but also will help to keep the stormdrain system clear and working properly.

The stormwater management system for the station will also include a detention pond to mitigate any increase in peak flow rates generated by the station. The detention pond will be sized to accommodate runoff generated by storms up to and including the 100 year event. An outlet control structure will be designed to release stormwater at a controlled rate which will not exceed existing conditions for both the 10 and 100 year events. Table 12.4-1, which indicates the estimated peak stormwater flow rates for the station site under existing and proposed conditions, shows that the peak flows will not exceed existing conditions. The supporting watershed mapping and TR-55 analysis with computer modelled hydrographs are included in Appendix Volume II, Section 5.

Table 12.4-1 Peak Runoff Rates Millbury Station Route 122 Alternative

Storm Event	Existing Conditions	Proposed Conditions
10 Year	5.2 cfs	4.3 cfs
100 Year	10.4 cfs	5.3 cfs

The proposed stream crossing will be designed to minimize any adverse impacts to the stream. Alternative crossing methods include reinforced concrete culverts, corrugated metal culverts, box culverts and low-profile arch culverts. These alternatives will be reviewed by and coordinated with the Millbury Conservation Commission to minimize impact on the stream environments and flow characteristics.

Water Supply

The Town of Millbury is served by a private water company, the Massachusetts American Water Works Company. The nearest well, according to the Superintendent of Operations, is the Oak Pond Well off Wheelock Street, approximately one mile southwest of the station site. This town well is located within the Dorothy Pond watershed area as opposed to the Flint Pond watershed area encompassing the station site. Most of the area in the vicinity of the proposed station site is served by the water company. Some of the residences south of the railroad have private shallow drinking water wells. All but one of these residences is located on the opposite side of the stream from the station. During the final design process and hazardous materials investigation for this site, the location of any private wells that might be hydrologically impacted by the stormwater drainage system for the station will be identified and evaluated. Since the discharge point from the proposed detention area is within the same reach of the stream that currently drains its watershed, impacts on

recharge characteristics are unlikely. The BMP's discussed above will serve to mitigate impacts on water quality and quantity. Extension of the public water supply to this area or relocation of existing private wells could be considered if the final design process determines that water supply mitigation is necessary.

12.5 Wetlands and Wildlife

As described in the preceding Section 12.4, the proposed access drive to the station site would involve crossing a small stream (wetland Area 2 in Section 7.5). There is no other way to access the site, although an alternative alignment that followed the abandoned track bed southerly to Route 122 was evaluated and determined to be infeasible because of topographic, road geometry and sight distance constraints.

The permanent stream originates in an area of bordering vegetated wetland, is carried in a culvert under Wildwood Road and in another culvert under the abandoned railroad embankment into an unnamed pond adjacent to the power lines. The drainage eventually flows into Flint Pond. The stream is bordered by a wooded wetland plant community.

The stream crossing structure type will be determined in final design. As shown in Table 7.5-1, construction is estimated to involve 450 square feet of bordering vegetated wetlands and 150 square feet of land under a waterway. During the design process, coordination will be carried out with the Millbury Conservation Commission.

12.6 Historic Properties/Sites

There are no architectural resources located near the proposed Millbury Route 122 Station.

12.7 Archaeological Resources

The archaeological reconnaissance survey that the MBTA undertook as part of the EIR process included the location of the proposed station in Millbury at Route 122. The proposed station location occupies broadly level ground within 50 m. of vegetated wetland. These topographic characteristics confer a high probability that the proposed station area and the proposed station access road contain prehistoric sites. While significant disturbance is apparent immediately east of the proposed station location, it is not evident in the proposed station area. The proposed access road crosses an extremely variable terrain, most of which is extremely rough, rocky, and steep, with large areas of disturbance. Even though a stream with a vegetated wetland fringe flows across the proposed access road, the topographic characteristics infer that the northern 200 m. of this section of the access road need not be considered in any additional archaeological appraisal. The southern 100 m. of the proposed access road crosses the broadly flat top of a knoll before dropping steeply to the north. This section of the proposed access road has a higher likelihood of containing prehistoric sites. As a component of the preparation of the FEIR, an intensive archaeological survey will be conducted to determine if potentially significant archaeological resources are present on the site.

12.8 Visual Impacts

The station will be within sight of only a few residential properties and, generally, is in an isolated location.

The design elements of the commuter rail station will represent a marked visual contrast with the undeveloped nature of the existing site. The station, however, will be well removed from most houses and there will be opportunities for landscaped buffer zones and fencing to maintain a separation between the uses.

The major visual features will be the parking lot and the pedestrian overpass structure and a protective canopy on the in-bound platform located on the south side of the tracks.

The pedestrian overpass will connect the north and south sides of the tracks with the platforms and the parking lot. The overpass will clear the tracks by 21'-0" and, with its canopy, have a total elevation of about 30 feet above the tracks. Covered

stairways and a covered access ramp will connect to the overpass on either side of the tracks. Fencing will discourage crossing the tracks at grade. The overpass will be a dominant feature near the tracks but will be less visible at a distance due to the wooded nature of much of the surroundings.

Cost-effective, high-pressure sodium light fixtures on 30 foot poles will be used for lighting the parking lot. The fixtures will be of the cut-off type which direct lighting downward with minimum spillover to adjoining properties. The light source from such fixtures is visible only to someone standing directly under the light. The lights will be on from dusk to one-half hour after the last train arrives in the evening. Photoelectric switches will turn the lights on and a time clock will turn them off.

Overall, the proposed project will have a minimal visual impact with the exception of some visual changes to the few residential houses on President Road which are close to or abutting the parking lot.

12.9 Hazardous Materials

An environmental site evaluation was performed for the proposed Millbury Station - Route 122 Alternative. The purpose of the evaluation was to determine whether surficial or historical evidence indicates that hazardous materials or oil is present in soil or groundwater at the site, within the meaning of Massachusetts General Laws, Chapter 21E (21E). The purpose of 21E and its implementing regulations (310 CMR 40.00 - The Massachusetts Contingency Plan) is to "ensure the protection of health, safety, public welfare, and the environment by establishing requirements and procedures for the discovery, notification, assessment of, and response to, releases and threats of releases of oil or hazardous materials, and by identifying these oils and hazardous materials which are subject to these requirements and proceedings."

The environmental site evaluation included the following elements:

1. A review of the site's history which concluded that the project site was vacant and undeveloped in the early to mid 1800s. The southern portion of the site, which the proposed access road will traverse, currently occupied by Barrett Centrifugals, was occupied by a brick foundry in the late 1800s. A railroad depot was located in the northeastern corner of the site from 1870 to the early 1980s. The remaining site areas have remained undeveloped and/or residential since the mid 1800s.

2. A review of state and local records which indicated no record of spills/releases of hazardous materials or oil at the project site. However, the nearby Wyman-Gordon facility (manufacturers of airplane components), located approximately ¼ mile east, is identified as a confirmed disposal site. Additionally, numerous spills of various hazardous materials and oil have occurred at the Wyman-Gordon facility since the mid 1980s.

3. A site reconnaissance to observe surficial conditions for evidence of hazardous materials or oil.

The results of the environmental site evaluation rendered the opinion that, although no surficial evidence of spills/releases of hazardous materials were observed in the residential and undeveloped areas, oil and hazardous materials may be present within the soils and groundwater at the project site. This opinion is based on the following:

- The Wyman-Gordon Facility is located within ¼ miles of the project site.
- Most of the proposed parking lot will be constructed on land now owned by the Wyman-Gordon Company.
- The use of hazardous materials and oils, predominantly paints and oil, by Barrett Centrifugals along with the presence of an on-site septic system receiving waste water from sinks and drains in production areas of the building presents a potential for hazardous materials/oil to be released to the soil and groundwater via the septic system.

A comprehensive subsurface exploration program for the site will be completed prior to any final design or construction activities.

12.10 Pedestrian Safety

The CTPS ridership projections do not forecast any patrons walking to the Millbury Station. The proposed access road from Route 122 to the station does not connect any pedestrian attractions, and a sidewalk is not proposed as part of the access road construction.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge accessible to the

handicapped will be constructed over the tracks to connect station platforms to parking facilities.

12.11 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation,and safety. Station site work will involve clearing, excavation, foundation construction, paving and installing/erection of site facilities such as pedestrian bridges and station canopies. Construction equipment likely to be used includes graders, bulldozers, backhoes, cranes and trucks.

Construction related traffic impacts are not expected to be significant. During certain short-term phases of construction, there will be concentrated deliveries of materials, such as during paving of the parking areas. Station construction will not be particularly labor-intensive, either, and traffic generated by the labor force will not adversely affect level of service on nearby roads. Temporarily, until the access road is graded sufficiently to allow traffic, access to the station site will be via local streets.

There will be short-term, intermittent increases in emissions from construction equipment and site-related construction traffic. No violations of air quality standards are anticipated.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of an order-of-conditions issued by the Millbury Conservation Commission will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise and vibration impacts and possible mitigation are described in the preceding Section 12.3.

Station site construction activities that present a potential safety concern would be secured by temporary fencing or other barriers. The Contractor will be required to

adhere to all pertinent regulations regarding use and storage of hazardous or toxic materials on the site.

12.12 Proposed Mitigation and Mitigation Options

The traffic analyses of roads and intersections within the Millbury Study area were reviewed to identify locations which may require mitigation in accordance with the MBTA Mitigation Policy outlined in Section 3.7. Only one location was identified, as discussed below.

The intersection of Grafton Road (Route 122) and the Mass Turnpike Exit 11 ramp will experience a reduction in level of service from LOS D to LOS E in the 1996 P.M. peak hour. A review of traffic count data indicates a significant left turn volume from the Exit 11 ramp to Grafton Road particularly in the P.M. peak hour. To accommodate this movement and to upgrade the overall efficiency of the intersection, the ramp approach should be upgraded from a single lane approach to a two lane approach. Allowing ramp traffic to turn left to Grafton Road in two lanes would improve the operation of the intersection to an acceptable LOS C. Widening on both the ramp approach and on Grafton Road would be required to accomplish the improvement. It appears land takings would be required to achieve the necessary widening on Grafton Road.

Impacts associated with improvements to the Grafton Road/Exit 11 intersection include land acquisition, traffic signal reconstruction and possible drainage impacts.

Construction noise and vibration impacts and possible mitigation are described in Section 12.3.

MILLBURY STATION - Route 20

12.13 Local Traffic

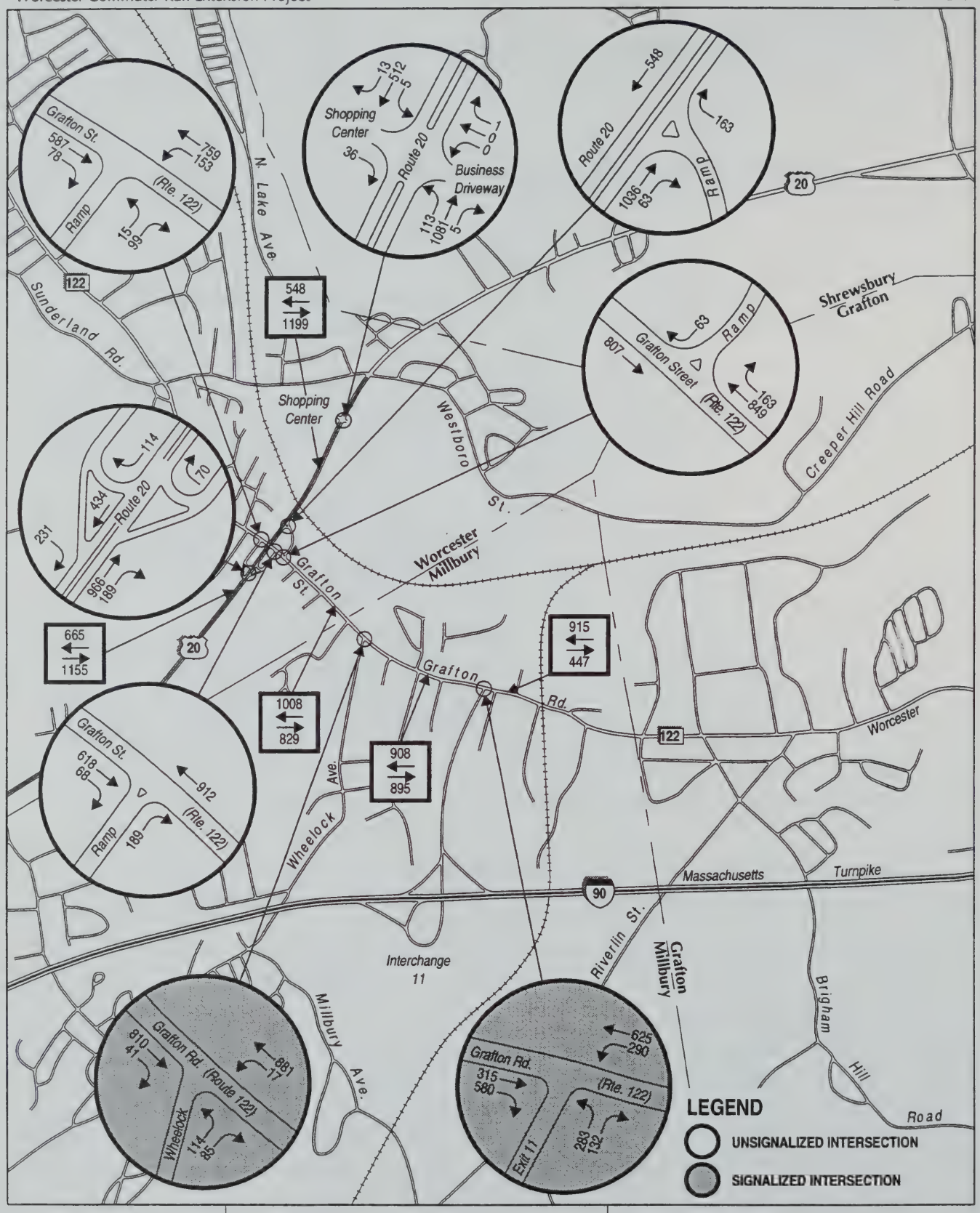
This section provides a summary of the complete traffic analysis included in Appendix, Volume I, Section 1.0. This section summarizes existing traffic conditions in Millbury, projected ridership for the Millbury Station and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Millbury Station focused on the streets and intersections in the Certificate of the Secretary of Environmental Affairs. Figures 12.13-1 (A.M. Peak Hour) and 12.13-2 (P.M. Peak Hour) show the location of the streets and intersections that were analyzed as part of the study.

Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection. A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours as well as the A.M. and P.M. peak generator hours. The A.M. and P.M. peak hours are those periods when traffic conditions are heaviest. The A.M. and P.M. peak generator hours are those periods when usage of the rail station is heaviest. Traffic count data showed that the A.M. and P.M. peak hours in Millbury are from 7:15 to 8:15 A.M. and 5:00 to 6:00 P.M., respectively. The A.M. and P.M. peak generator hours are from 6:45 to 7:45 A.M. and 6:00 to 7:00 P.M., respectively.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

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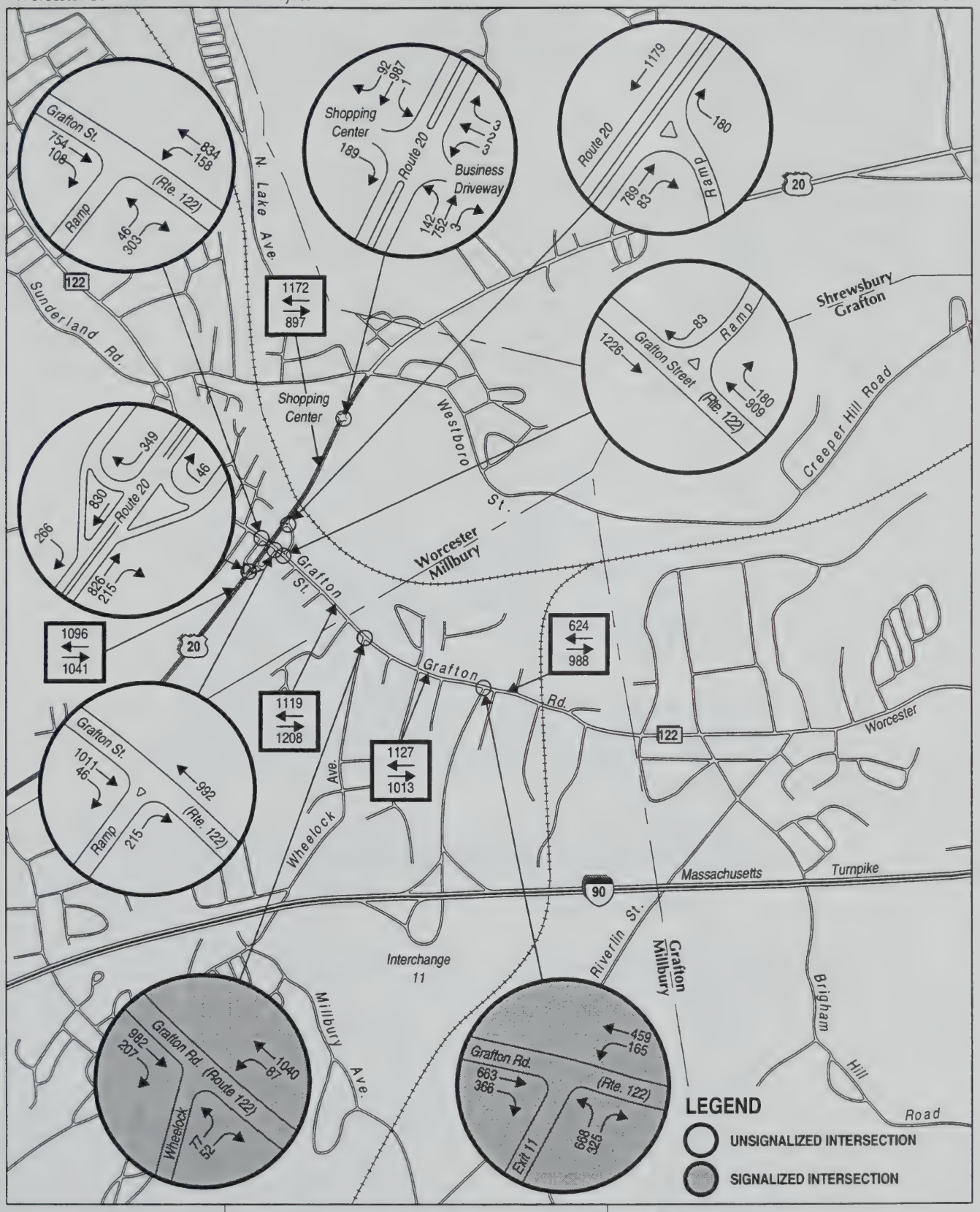
A.M. Peak Hour
7:15 - 8:15 A.M.
1992 Existing Conditions
Millbury Station - Route 20

FIGURE 12.13-1



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

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P.M. Peak Hour
5:00 - 6:00 P.M.
1992 Existing Conditions
Millbury Station - Route 20

FIGURE 12.13-2

Existing Conditions

Existing conditions were determined by traffic counts and intersection turning movement counts conducted in the Fall of 1992 and the Spring of 1993. The results of the counts were used to calculate existing condition levels of service for each of the intersections and street segments studied. Figures 12.13-1 and 12.13-2 show existing A.M. and P.M. peak hour volumes within the study area. Figure 12.13-3 shows existing Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

Table 12.13-1 shows the signalized intersection levels of service and Table 12.13-2 shows the unsignalized intersection levels of service. Roadway segment levels of service are shown in Table 12.13-3.

As shown in the tables, both the signalized and unsignalized intersections generally operate at acceptable levels of service in both the peak hours and peak generator hours. Traffic entering Grafton Street in Worcester from westbound Route 20 and traffic entering Route 20 from the existing truck business experience LOS F in the P.M. peak hour.

Table 12.13-3 indicates that for the most part the analyzed road segments are operating satisfactorily. Route 20 west of Route 122 functions at a low LOS E in the A.M. and P.M. peak hour, while Route 122 north of Exit 11 is at a low LOS E in the P.M. peak hours.

Table 12.13-1 1992 Existing Signalized Intersection Level of Service

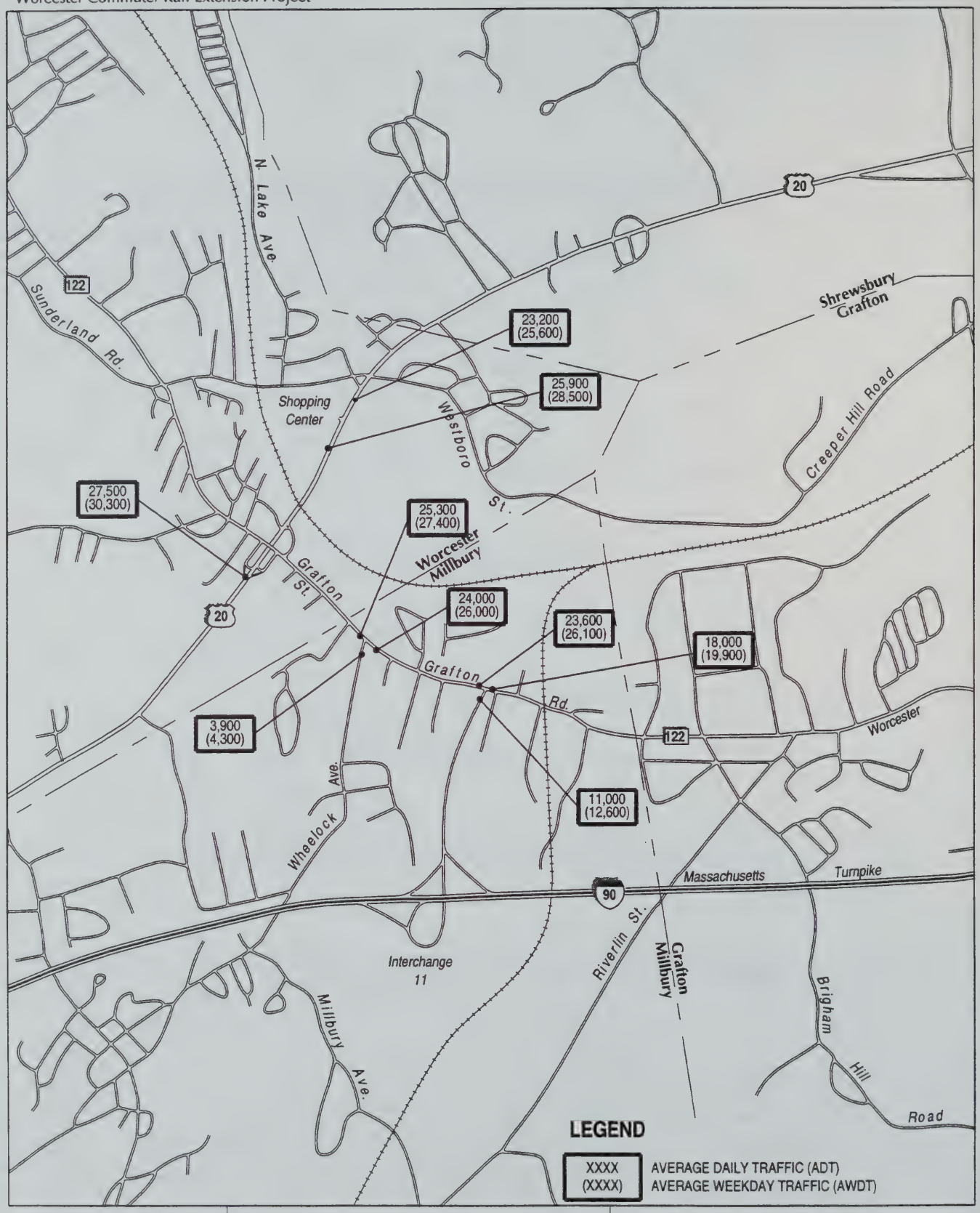
Millbury (Route 20)	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Route 122 and Exit 11	B	D	B	B
Eastbound	A	C	A	B
Westbound	A	C	A	B
Northbound	B	E	B	B
Route 122 and Wheelock	A	B	A	A
Eastbound	A	A	A	A
Westbound	A	B	A	A
Northbound	B	B	B	B

Table 12.13-2 1992 Existing Unsignalized Intersection Level of Service

Millbury (Route 20)	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Grafton and Route 20 West				
LT from NB Grafton	B	C	A	A
LT and RT from Ramp	E	F	D	D
SB Grafton and Route 20 East				
RT from Ramp	C	E	B	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	A	C	A	B
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	B	A	A	A
Route 20 and Mall				
LT from EB Route 20	A	D	A	B
LT from WB Route 20	C	B	B	A
All from Truck Business	A	F	D	D
RT from Mall	A	B	A	A

Table 12.13-3 1992 Existing Road Segment Level of Service

Millbury (Route 20)	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	A	A	A
WB Route 20 West of Mall	A	B	A	A



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

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1992 Average Daily Traffic and 1992 Average Weekday Traffic
Millbury, MA - Route 20

FIGURE 12.13-3

The Millbury Police Department was contacted on June 21, 1994 to determine the existence and location of any safety concerns or high accident locations. Chief Handfield indicated that no existing serious safety concerns or high accident locations currently exist within the MBTA study area in the Town of Millbury.

Rail Ridership Projections

Projections of rail ridership at each of the proposed stations of the Worcester Extension Project were prepared by the Central Transportation Planning Staff (CTPS) in May 1994. The full CTPS ridership projections memo is included in Appendix, Volume II, Section 2. In 1996, the CTPS projected that the Millbury Station would attract a total of 149 daily round trip commuters. It is expected that of the 149 daily commuters 12 will be dropped off at the station and that the remaining 137 commuters will be Park'n'Ride patrons. Based on a vehicle occupancy rate of 1.12, the 137 Park'n'Ride patrons will result in a demand for 123 parking spaces.

The patrons of the Millbury Station are projected to originate from the towns of Auburn, Charlton, Millbury, Oxford, and the City Of Worcester. Table 12.13-4 shows the towns of origin and the projected ridership from each town for the year 1996 for the proposed Millbury Commuter Rail Station.

Table 12.13-4 Town of Origin Millbury Station (Route 20) Projected Ridership - Year 1996

Town	Riders
Millbury	26
Oxford	17
Charlton	17
Auburn	27
Worcester	62
TOTAL	**149**

The impact of the commuter rail riders on area streets as they travel to the Millbury Station is determined by assigning those commuters to a particular route within the study area. Patrons who live in Millbury essentially have two basic routes to access the station. These are Wheelock Avenue to Route 122 southbound to Route 20 eastbound or directly on Route 20 to the station. The patrons who live in the City of Worcester will access the station by following routes: Sunderland Road to Route 20 westbound, Route 122 southbound to Route 20 eastbound, or directly on Route 20 eastbound to the station. The patrons from Auburn, Charlton, and Oxford are

expected to use Route 20 eastbound to the station. Figure 12.13-4 shows the distribution and percentages of station related traffic that would use the Millbury area roadways.

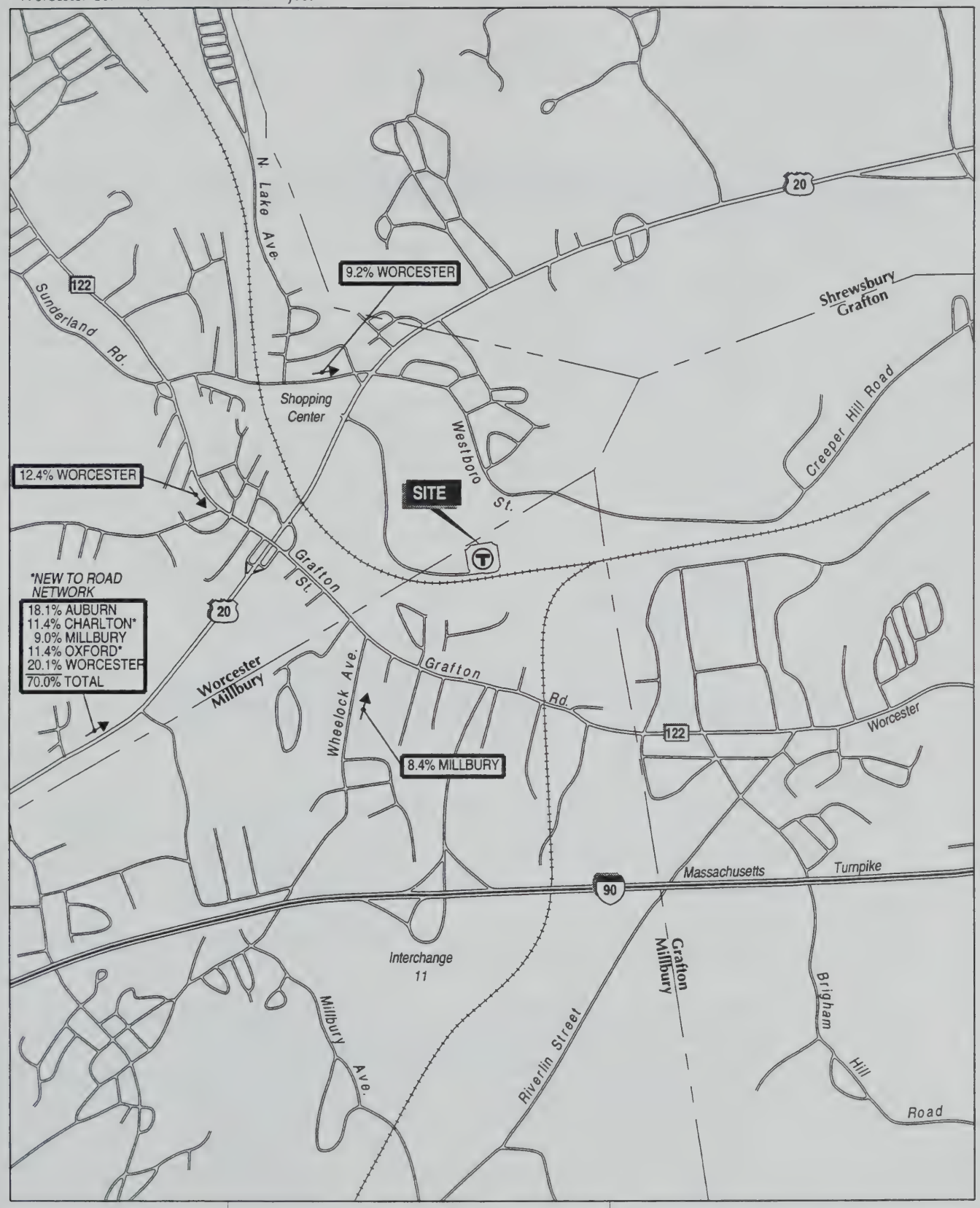
Assignment of Riders to Trains

Commuter rail riders to the Millbury Station would arrive at the station to catch one of four A.M. peak period trains and would leave the station in the P.M. peak period based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several MBTA commuter rail lines. The observations of distribution by train tend to show the greatest number of riders on the trains arriving at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, the observations also show greater ridership in the middle of what is normally considered peak commuting period.

1996 Traffic Impacts

The 1996 traffic impacts must also consider background growth of traffic in addition to existing traffic volumes and the new riders destined for the station. Background growth is usually determined by tracking historical growth rates at permanent count locations. During the 1980's, traffic grew at rates of 2 - 3% or more a year in many areas. Data from a permanent count location in Millbury on Route 122 showed the most recent trend to be minus 0.1% per year (decreasing traffic volumes). As a conservative approach, a 0.5% annual growth in traffic volumes was assumed from 1992 to 1996.

The traffic volumes for both a "No Build" and "Build" alternative were prepared. Levels of service were calculated for both the A.M. and P.M. peak hours and peak generator hours. The 1996 "No Build" alternative allows for a comparison with the 1996 "Build" alternative to determine if the additional traffic to or from the proposed commuter rail station will adversely impact the road network within the study area. In developing the "Build" alternative traffic volumes the commuter rail patrons from Auburn, Millbury, and Worcester currently accessing the Mass Pike at Exit 11 are considered by-pass traffic and therefore are not considered as new traffic to the study area. Traffic signal warrants were checked at the Route 20/Mall intersection to deter-



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750

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Distribution of Commuter Rail Station Traffic
1996 BUILD ALL STATIONS
Millbury Station - Route 20

FIGURE 12.13-4

mine if signalization is warranted after construction of the rail station. The P.M. peak hour and the P.M. peak generator hour volumes met the requirements for signal warrants.

Since most of the commuters from the Millbury Station will desire to make a left turn when exiting the station, it is proposed that this intersection be signalized and coordinated with the traffic signals at the intersection of Route 20 with Sunderland Road and Westborough Street. Analysis of the 1996 "Build" condition assumed signalization of this intersection.

In Millbury the peak hour and peak generator hour overlap by 30 minutes in the A.M. period and do not overlap in the P.M. period. Both peak hours and peak generator hours were analyzed to determine the greatest impact to the roadway network.

Tables 12.13-5 through 12.13-8 present the results of the LOS analysis for the signalized and unsignalized intersections. The tables reflect both "No Build" and "Build" conditions.

As shown in the "No Build" condition, both existing signalized intersections operate at acceptable levels of service. In the "Build" condition, the two existing signalized intersections as well as the proposed signalized intersection will have acceptable levels of service.

Generally, in both the "No Build" and "Build" conditions the unsignalized intersections are operating satisfactorily. As in the existing condition, traffic egressing westbound Route 20 to Grafton Street in Worcester will operate at LOS F in the P.M. peak hour. This occurs in both the "No Build" and "Build" conditions.

Tables 12.13-9 and 12.13-10 show the results of the road segment LOS analysis for the peak hours and peak generator hours.

As shown, the road segments are at LOS E or better in both the "No Build" and "Build" conditions. Route 20 west of Route 122 operates at a low LOS E in the "No Build" and "Build" conditions, Route 122 north of Wheelock Avenue and Route 122 north of Exit 11 are at a low LOS E in the peak hour "Build" condition.

Table 12.13-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	B	B	A	A
Eastbound	A	A	A	A
Westbound	A	A	A	A
Northbound	B	B	B	A
Route 122 and Wheelock	A	B	A	A
Eastbound	A	A	A	A
Westbound	A	B	A	A
Northbound	B	B	B	C
Route 20, Mall and Station Driveway	-	B	-	B
Eastbound	-	B	-	B
Westbound	-	B	-	B
Northbound	-	D	-	D
Southbound	-	D	-	B

Table 12.13-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	D	D	B	B
Eastbound	C	C	B	B
Westbound	D	D	B	B
Northbound	E	E	B	B
Route 122 and Wheelock	B	B	A	A
Eastbound	A	A	A	A
Westbound	B	B	A	A
Northbound	D	D	C	C
Route 20, Mall and Station Driveway	-	B	-	B
Eastbound	-	B	-	B
Westbound	-	B	-	B
Northbound	-	D	-	D
Southbound	-	C	-	C

Table 12.13-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	B	B	B	B
LT and RT from Ramp	E	E	D	D
SB Grafton and Route 20 East				
RT from Ramp	C	B	C	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	A	A	A	A
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	B	B	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	B	B	A	B
Route 20 and Mall				
LT from EB Route 20	A	-	A	-
LT from WB Route 20	C	-	C	-
All from Truck Business	A	-	D	-
RT from Mall	A	-	A	-

Table 12.13-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	C	C	A	A
LT and RT from Ramp	F	F	D	E
SB Grafton and Route 20 East				
RT from Ramp	E	E	B	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	C	C	B	B
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	A	A	A	A
Route 20 and Mall				
LT from EB Route 20	D	-	B	-
LT from WB Route 20	B	-	A	-
All from Truck Business	F	-	D	-
RT from Mall	C	-	A	-

Table 12.13-9 1996 Road Segment Level of Service - A.M. Peak Hours

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	B	A	B
WB Route 20 West of Mall	A	A	A	A

Table 12.13-10 1996 Road Segment Level of Service - P.M. Peak Hours

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	A	A	A	A
WB Route 20 West of Mall	B	B	A	A

1996 Traffic Impacts - Millbury Station Only

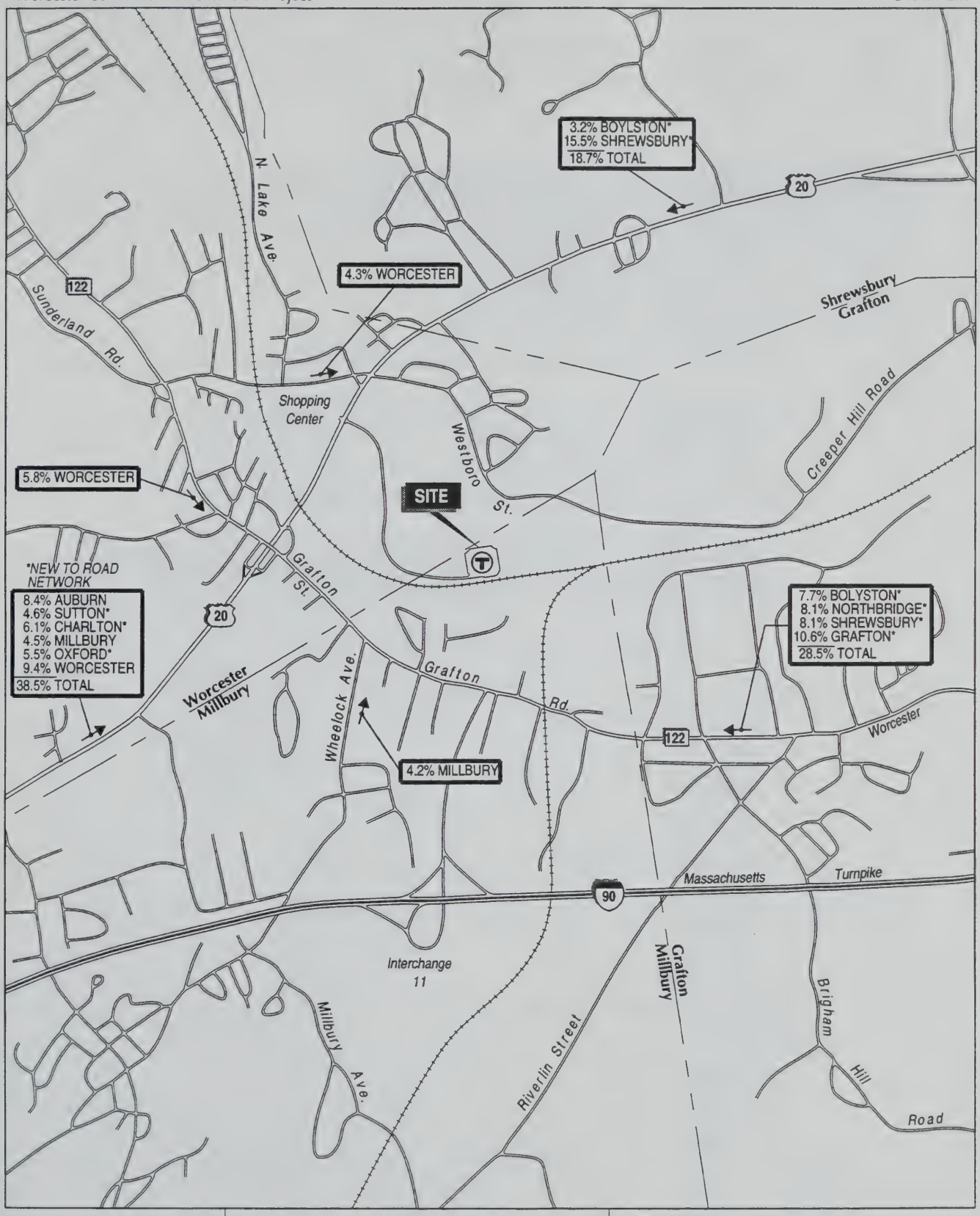
In order to address an upper limit, worst case situation with regard to traffic impacts on Millbury streets, an analysis was performed which considered that the Millbury commuter station was the only commuter station built by 1996 (in addition to a Worcester Station).

CTPS projected that under this scenario the Millbury Station would attract 347 daily round trip commuters, 319 of which would be Park'n'Ride patrons. Site traffic was distributed over the roadway network in a manner similar to that used for the 1996 "Build All Stations" scenario. The projected distribution of traffic is shown in Figure 12.13-5.

A LOS analysis was performed for the peak hour and peak generator hour "Build" condition. The "No Build" condition is the same as previously presented in the "Build All Stations" scenario.

The results of the LOS analysis for the signalized and unsignalized intersections is shown in Tables 12.13-11 through 12.13-14.

Both existing signalized intersections will operate at acceptable levels of service in the "No Build" condition. In the "Build" condition the existing signalized intersections as well as the proposed signalized intersection will have acceptable levels of service. No reduction in level of service will occur at the existing signalized locations in the "Build" condition.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750

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Distribution of Commuter Rail Station Traffic
1996 BUILD Millbury Only
Millbury Station - Route 20

FIGURE 12.13-5

The unsignalized intersections for the most part operate satisfactorily in both the "No Build" and "Build" conditions. As the tables indicate, several movements would experience some reduction in LOS in the "Build" condition. As in the existing condition, the turning movement from westbound Route 20 to Grafton Street in Worcester will operate at LOS F in the P.M. peak period. This occurs under both the "No Build" and "Build" conditions.

Tables 12.13-15 and 12.13-16 list the findings of the analysis of the road segments.

All of the road segments are functioning at LOS E or better for both "No Build" and "Build" conditions. Route 20 west of Route 122, Route 122 north of Wheelock Avenue and Route 122 north of Exit 11 all function at a low LOS E during certain peak periods in both the "No Build" and "Build" conditions.

Table 12.13-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only)

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	B	B	A	A
Eastbound	A	A	A	A
Westbound	A	A	A	A
Northbound	B	B	B	B
Route 122 and Wheelock	A	A	A	A
Eastbound	A	A	A	A
Westbound	A	A	A	A
Northbound	B	B	B	B
Route 20, Mall and Station Driveway	-	B	-	B
Eastbound	-	B	-	B
Westbound	-	B	-	B
Northbound	-	D	-	D
Southbound	-	D	-	C

Table 12.13-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only)

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	D	D	B	B
Eastbound	C	C	B	B
Westbound	D	D	B	B
Northbound	E	E	B	B
Route 122 and Wheelock	B	B	A	A
Eastbound	A	A	A	A
Westbound	B	B	A	A
Northbound	D	D	C	C
Route 20, Mall and Station Driveway	-	C	-	C
Eastbound	-	B	-	B
Westbound	-	B	-	B
Northbound	-	C	-	D
Southbound	-	D	-	C

Table 12.13-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Millbury Station Only)

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	B	B	B	B
LT and RT from Ramp	E	E	D	D
SB Grafton and Route 20 East				
RT from Ramp	C	B	C	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	A	A	A	A
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	B	B	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	B	C	A	B
Route 20 and Mall				
LT from EB Route 20	A	-	A	-
LT from WB Route 20	C	-	C	-
All from Truck Business	A	-	D	-
RT from Mall	A	-	A	-

Table 12.13-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Millbury Station Only)

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Grafton and Route 20 West				
LT from NB Grafton	C	C	A	A
LT and RT from Ramp	F	F	D	E
SB Grafton and Route 20 East				
RT from Ramp	E	E	B	B
NB Grafton and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Grafton				
RT from Ramp to WB 20	C	C	B	B
EB Route 20 and SB Grafton				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Grafton				
RT from Ramp to EB 20	A	A	A	A
Route 20 and Mall				
LT from EB Route 20	D	-	B	-
LT from WB Route 20	B	-	A	-
All from Truck Business	F	-	D	-
RT from Mall	C	-	A	-

Table 12.13-15 1996 Road Segment Level of Service - A.M. Peak Hours (Millbury Station Only)

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	E
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	B	A	A
WB Route 20 West of Mall	A	A	A	A

Table 12.13-16 1996 Road Segment Level of Service - P.M. Peak Hours (Millbury Station Only)

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	A	A	A	A
WB Route 20 West of Mall	B	B	A	A

2001 Traffic Impacts

The level of service analysis was conducted for the Millbury Station study area using year 2001 "No Build" and "Build" traffic volumes. To account for normal background traffic growth, an annual growth factor of 1.5% was applied to the 1996 "No Build" volumes to develop the 2001 "No Build" volumes.

CTPS projected that the Millbury Station would attract a total of 162 daily round trip commuters to Boston. It projected that 149 of the commuters would be Park'n'Ride patrons. Projected percentage distribution of traffic is essentially the same as shown in Figure 12.13-4.

The LOS analysis was conducted for both the peak hour and peak generator hour "No Build" and "Build" condition. As in the 1996 analysis, the intersection of Route 20 and the Mall was analyzed as a signalized intersection in the 2001 "Build" condition.

The results of the LOS analysis for the signalized and unsignalized intersections are presented in Tables 12.13-17 through 12.13-20.

The analysis indicates that the signalized intersection of Route 122 and Exit 11 will experience LOS F conditions in the P.M. peak hour "No Build" condition. The intersection will also operate at LOS F in the P.M. peak hour "Build" condition. The Route 122/Wheelock Avenue intersection operates acceptably in both "No Build" and "Build" conditions. The proposed signalized intersection at Route 20 and the Mall will function acceptably in the "Build" condition.

While several unsignalized intersection movements will experience some reduction in LOS in the "Build" condition, most will continue to function at acceptable levels. As in the previous analyses, failure conditions exist in the P.M. peak hour under both the "No Build" and "Build" conditions for traffic turning from westbound Route 20 to Grafton Street in Worcester. This movement will deteriorate from a low LOS E to LOS F in the A.M. peak hour "Build" condition.

Tables 12.13-21 and 12.13-22 present the road segment LOS results.

All segments will function at LOS E or better under both the "No Build" and "Build" conditions. As in the existing condition and the 1996 condition analyses Route 20 west of Route 122 will operate at a low LOS E. A reduction in capacity due to normal background traffic growth will cause Route 122 north of Exit 11 and Route 122 north of Wheelock to experience a low LOS E in the peak periods. This will occur with or without construction of a commuter rail station.

Table 12.13-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	B	B	A	A
Eastbound	A	A	A	A
Westbound	B	B	A	A
Northbound	B	B	B	B
Route 122 and Wheelock	A	A	A	A
Eastbound	A	A	A	A
Westbound	A	A	A	A
Northbound	B	B	B	C
Route 20, Mall and Station Driveway	-	A	-	B
Eastbound	-	A	-	B
Westbound	-	B	-	B
Northbound	-	D	-	D
Southbound	-	D	-	B

Table 12.13-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 and Exit 11	F	F	B	B
Eastbound	C	C	B	B
Westbound	F	E	B	B
Northbound	F	F	B	B
Route 122 and Wheelock	B	B	A	A
Eastbound	A	A	A	A
Westbound	C	B	A	A
Northbound	E	E	C	C
Route 20, Mall and Station Driveway	-	B	-	B
Eastbound	-	B	-	B
Westbound	-	B	-	B
Northbound	-	C	-	D
Southbound	-	C	-	C

Table 12.13-19 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Millbury and Route 20 West				
LT from NB Millbury	B	C	B	B
LT and RT from Ramp	E	F	D	E
SB Millbury and Route 20 East				
RT from Ramp	C	C	C	C
NB Millbury and Route 20 East				
RT from Ramp	C	C	B	B
WB Route 20 and Millbury				
RT from Ramp to WB 20	A	A	A	A
EB Route 20 and SB Millbury				
RT from Ramp to EB 20	B	B	A	A
EB Route 20 and NB Millbury				
RT from Ramp to EB 20	C	C	B	B
Route 20 and Mall				
LT from EB Route 20	B	-	A	-
LT from WB Route 20	D	-	C	-
All from Truck Business	A	-	E	-
RT from Mall	A	-	A	-

Table 12.13-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Millbury and Route 20 West				
LT from NB Millbury	C	C	B	A
LT and RT from Ramp	F	F	E	E
SB Millbury and Route 20 East				
RT from Ramp	E	E	B	B
NB Millbury and Route 20 East				
RT from Ramp	D	D	B	B
WB Route 20 and Millbury				
RT from Ramp to WB 20	D	D	B	B
EB Route 20 and SB Millbury				
RT from Ramp to EB 20	A	A	A	A
EB Route 20 and NB Millbury				
RT from Ramp to EB 20	B	B	A	A
Route 20 and Mall				
LT from EB Route 20	E	-	C	-
LT from WB Route 20	B	-	A	-
All from Truck Business	F	-	E	-
RT from Mall	C	-	A	-

Table 12.13-21 2001 Road Segment Level of Service - A.M. Peak Hours

Millbury (Route 20)	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	E	E
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	B	B	B	B
WB Route 20 West of Mall	A	A	A	A

Table 12.13-22 2001 Road Segment Level of Service - P.M. Peak Hours

Millbury (Route 20)	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 122 South of Exit 11	E	E	D	D
Route 122 North of Exit 11	E	E	E	E
Route 122 North of Wheelock	E	E	E	E
Route 20 West of Route 122	E	E	E	E
EB Route 20 West of Mall	A	A	A	A
WB Route 20 West of Mall	B	B	A	A

Summary of Findings

The analysis indicates that traffic generated by the proposed commuter rail station on Route 20 would not significantly impact level of service at any of the locations within the study area. Much of the traffic that would use the commuter rail station is existing traffic already utilizing the roads to access the Turnpike at Exit 11. This reduces the amount of new traffic introduced to the road network. Currently, the turning movements at the ramp from westbound Route 20 to Grafton Street in Worcester operate at unacceptable levels. This situation is due to the substandard design of the interchange and will continue with or without construction of a rail station.

In summary, while general improvements to increase capacity are warranted on both Route 122 and Route 20, traffic generated by the proposed commuter rail station will not adversely impact the operating characteristics of the roadways.

12.14 Air Quality

This proposed station site also uses the Route 122/Massachusetts Turnpike Exit 11 intersection for the worst case CO analysis (see Figure 12.13-1). The proposed signalized intersection at the station driveway off Route 20 does not have the traffic characteristics, nor the potential sensitive receptors, that exist for the intersection cited in Section 12.2. Given that the analyzed intersection will operate at the same LOS as under the Route 122 Station option, but with less delays on all legs of the intersection, the prediction CO concentrations will be somewhat less than those

predicted under the Route 122 Station option. No violations of the CO standards are projected.

12.15 Noise and Vibration

Traffic Noise Impacts

There are no residential land uses likely to be affected by increased passenger traffic noise in the vicinity of the proposed Millbury Station site accessed by Route 20.

Station Construction Impacts

Similarly, no residences are expected to be impacted by station construction.

12.16 Site Drainage

The site of the proposed Millbury Station Route 20 Alternative, is located in the northernmost corner of the Town of Millbury, just north of the railroad tracks and within the Blackstone River Watershed. The parking lot site consists of wooded areas with irregular topography. Wetland resources border the site to the east and hilly wooded areas with rock outcrops border the site to the west. The station will be accessed by a new 3,000 foot long road beginning at Route 20 (Southwest Cutoff) just opposite the Big Y Shopping Center driveway. The proposed access driveway would extend through a large industrial/trucking facility. Much of the driveway would be constructed through rock and would require drilling and blasting. A detailed underdrain system would be designed and installed through areas of rock excavation.

Site area stormwater currently drains in an easterly direction into the wetland resources, and then flows in a small stream northeasterly to Flint Pond. Runoff from a portion of the proposed access drive tributary area currently flows in a westerly direction, towards Route 20. The remaining area drains to an isolated wetland located approximately 100′ west of this new roadway.

A Best Management Practices (BMP) plan will include a regular parking lot sweeping program, catch basins equipped with sumps and oil and grease traps, and the installation and maintenance of a siltation control barrier during construction.

Additional water quality BMP alternatives including stilling basins and vegetated swales will be discussed with the Millbury Conservation Commission prior to final design.

A stormwater detention basin also will be designed to mitigate any impacts generated by stormwater runoff from the proposed parking lot, and to ensure that no increase in the peak rate of flow occurs. The detention basin will be sized to accommodate stormwater runoff generated by storms up to and including the 100 year event. An outlet control structure will be designed to release stormwater at a controlled rate which will not exceed existing flow rates under the 10 and 100 year events. Table 12.16-1 compares peak runoff rates for the 10 and 100 year storm events. Watershed mapping, TR-55 analysis and computer generated hydrographs are included in Appendix Volume II, Section 5.

Table 12.16-1 Peak Runoff Rates Millbury Station Route 20 Alternative

Storm Event	Existing Conditions	Proposed Conditions
10 Year	11.7 cfs	10.4 cfs
100 Year	28.8 cfs	21.8 cfs

Water Supply

The Town of Millbury is serviced by a private water company, the Massachusetts American Water Works Company. The nearest well, according to the Superintendent of Operations, is the Oak Pond Well on Wheelock Street, approximately one mile southwest of the station site. Most of the area in the vicinity of the proposed station site is served by the water company. Some of the residences south of the railroad have private shallow drinking water wells. During the final design process and hazardous materials investigation for this site, the location of any private wells that might be hydrologically impacted by the stormwater drainage system for the station will be identified and evaluated.

12.17 Wetlands and Wildlife

Wetland resources in the vicinity of the Millbury Station Route 20 Alternative site include a pond with associated bordering vegetated wetlands that lies generally north of the existing railroad embankment, east of Route 20 and south of the proposed access drive. There is no defined outlet from the pond but the drainage patterns seem

to flow towards the trucking facility drainage system. The area to the rear of the trucking facility appears to have been disturbed by past earth moving operations. The proposed access drive will require some grading within the 100 foot buffer zone of the pond and bordering wetlands. The alignment of the drive has been designed to avoid wetland impacts and grading will be at least 75 feet from the resource area.

A bordering vegetated wetland (Area 1 on Figure 7.4-2) with a mature red maple (Acer rubrum) tree canopy and a woody understory lies to the east of the proposed parking lot and adjacent to the railroad. The topography is pit and mound and a shallow stream channel drains to a tributary stream of Flint Pond. The parking lot has been configured to avoid the wetlands but will be within the 100 foot buffer zone. Coordination will be carried out with the Millbury Conservation Commission during the final design process for the selected alternative.

12.18 Historic Properties/Sites

There are no architectural resources located near the proposed Millbury Route 20 Station.

12.19 Archaeological Resources

The archaeological reconnaissance survey that the MBTA undertook as part of the EIR process included the location of the proposed station in Millbury at Route 20. The proposed station location occupies broadly level terrain on the eastern side of a rocky knoll, overlooking a vegetated wetland. No significant disturbance is evident in the proposed station area. These topographic characteristics confer a high probability that the proposed station area contains prehistoric sites. The proposed station access road crosses an industrial parking lot before cutting through the rocky knoll. The existing disturbance of the parking lot, and the steeper slope and rocky soils of the knoll confer a low probability that these sections of the proposed access road contain prehistoric sites. However, the eastern 100 m. of the access road share the characteristics of the proposed station, and similarly have a high likelihood of containing prehistoric sites. As a component of the preparation of the FEIR, an intensive archaeological survey will be conducted to determine if potentially significant archaeological resources are present on the site.

12.20 Visual Impacts

The physical features of the station, including a parking area, lighting, passenger canopies, an overpass, and covered stairways and access ramps, will be similar to those identified for the Millbury Station Route 122 alternative.

The station facilities will not be visible from residences during periods when the leaves are on the trees with the possible exception of one or two houses on President Road in Millbury. The station will be more visible during the winter months, but the overall visual impact will be very small.

12.21 Hazardous Materials

An environmental site evaluation was performed for the proposed Millbury Station Route 20 Alternative. The purpose of the evaluation was to determine whether surficial or historical evidence indicated that hazardous materials or oil were present in soil or groundwater at the site, within the meaning of Massachusetts General Laws, Chapter 21E. The purpose of 21E and its implementing regulations (310 CMR 40.00 - The Massachusetts Contingency Plan) is to "ensure the protection of health, safety, public welfare, and the environment by establishing requirements and procedures for the discovery, notification, assessment of, and response to, releases and threats of releases of oil or hazardous materials, and by identifying these oils and hazardous materials which are subject to these requirements and proceedings."

The environmental site evaluation was limited to the proposed parking lot area and did not extend along the alignment of the access road to Route 20. The site evaluation included the following elements:

1. A review of the site's history, which concluded that the site has been vacant and undeveloped since the mid 1800s.

2. A review of state and local records, which indicated no record of spills/releases of hazardous materials or oil at the project site.

3. A site reconnaissance to observe surficial conditions for evidence of hazardous materials or oil.

The results of the environmental site evaluation rendered the opinion that, although no surficial evidence of spills/releases of hazardous materials or oil were detected in the residential and undeveloped areas, oil and hazardous materials may be present within the soils and groundwater at the project site. This opinion is based on the following:

- The Wyman-Gordon facility is located within ½ mile of the project site.
- Barrett Centrifugals is located within ¼ mile and upgradient of the site.
- The use of hazardous materials and oils, predominantly paints and oil, by Barrett Centrifugals, along with the presence of an on-site septic system receiving waste water from sinks and drains in production areas of the building, presents a potential for hazardous materials/oil to be released to the soil and groundwater via the septic system.

A comprehensive subsurface exploration program for the site will be completed prior to any final design or construction activities.

12.22 Pedestrian Safety

The CTPS ridership projections do not forecast any patrons walking to the Millbury Station. The proposed access road from Route 20 to the station does not connect any pedestrian attractions, and a sidewalk is not proposed as part of the access road construction.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge, accessible to the handicapped, will be constructed over the tracks to connect station platforms to parking facilities.

12.23 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation,and safety. Station site work will involve clearing, excavation, foundation construction, paving and installing/erection of site facilities such as pedestrian bridges and station canopies. Construction equipment likely to be used includes graders, bulldozers, backhoes, cranes and trucks.

Construction related traffic impacts are not expected to be significant. During certain short-term phases of construction, there will be concentrated deliveries of materials, such as during paving of the parking areas. Station construction will not be particularly labor-intensive, either, and traffic generated by the labor force will not adversely affect level of service on nearby roads. Access to the station site will require construction of the proposed driveway as the initial phase of work.

There will be short-term, intermittent increases in emissions from construction equipment and site-related construction traffic. No violations of air quality standards are anticipated.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of an order-of-conditions issued by the Millbury Conservation Commission will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise and vibration impacts and possible mitigation are described in the preceding Section 12.3.

Station site construction activities that present a potential safety concern would be secured by temporary fencing or other barriers. The Contractor will be required to adhere to all pertinent regulations regarding use and storage of hazardous or toxic materials on the site.

12.24 Proposed Mitigation and Mitigation Options

The traffic analyses of roads and intersections within the Millbury Study area were reviewed to identify locations which may require mitigation in accordance with the MBTA Mitigation Policy outlined in Section 3.7.

Generally, the locations impacted by the Route 20 alternative station are the same as those discussed in Section 12.12 for the Route 122 Station alternative.

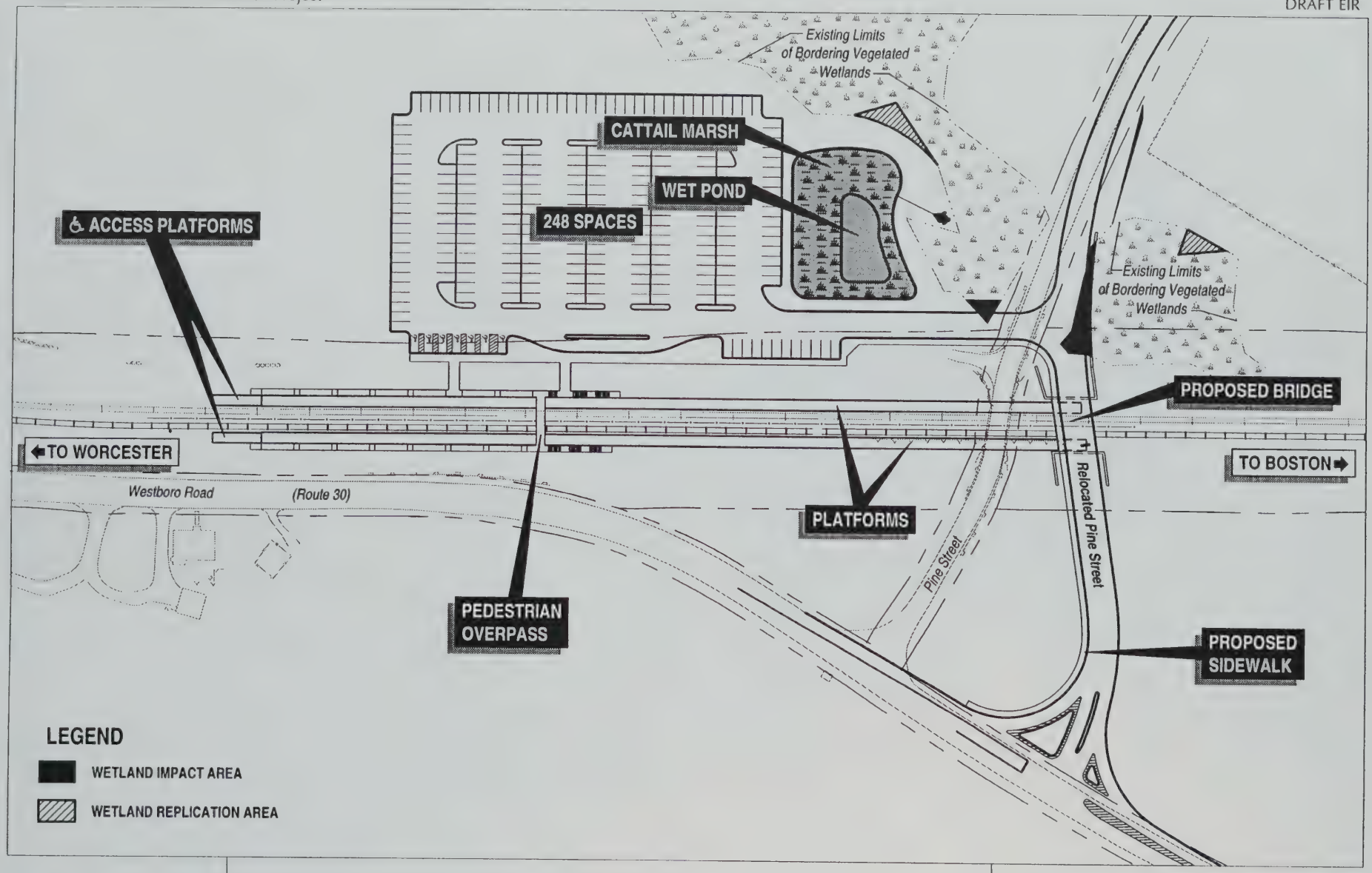
The impact of station generated traffic on the Grafton Road/Exit 11 intersection is fairly minimal though some increased delays will occur in the P.M. peak hour. The intersection currently operates at a poor level of service in the P.M. peak hour and no change in level of service will occur due to station generated traffic. The improvements necessary to bring the intersection to an acceptable level of service (which are needed with or without the commuter rail project) are outlined in Section 12.12.

SECTION 13.0 ENVIRONMENTAL IMPACTS—GRAFTON STATION

The proposed commuter rail station in Grafton will be constructed west of Pine Street and north of the railroad tracks on land owned by the Commonwealth of Massachusetts Division of Capital Planning and Operations and reserved for the MBTA station. In addition to the standard station amenities, parking will be provided for 248 vehicles. The Pine Street bridge is proposed for reconstruction by the Massachusetts Highway Department under its ongoing program for replacement of functionally obsolete and structurally deficient bridges. Design and construction of the Pine Street bridge is scheduled to be compatible with the commuter rail station construction. The site plan is shown on Figure 13.0-1.

The Pine Street station is projected to attract 116 patrons in 1996, with daily ridership increasing to 149 by the year 2011. Station generated traffic is not expected to result in any significant impact on existing levels of service for local streets. During construction, short-term noise and vibration impacts could occur at two residences on Route 30.

The station site construction will displace wetland resources, in addition to work within the buffer zone. A detention pond is proposed to maintain stormwater discharge flows at or below existing conditions. All work affecting resources areas will be coordinated with the Grafton Conservation Commission.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'
0 125

SITE PLAN
GRAFTON, MA

FIGURE 13.0-1

13.1 Local Traffic

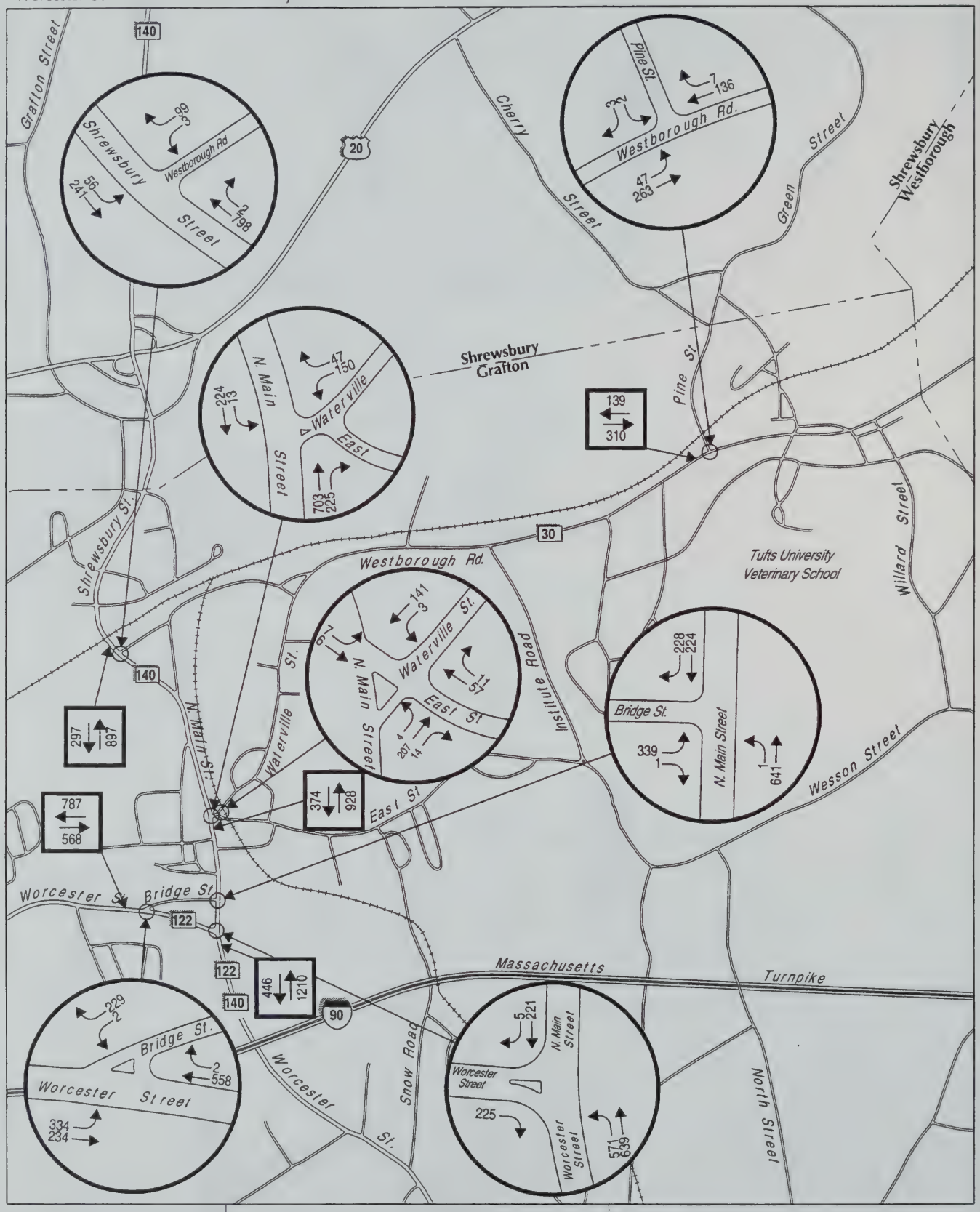
This section provides a summary of the complete traffic analysis included in Appendix, Volume I. This section summarizes existing traffic conditions in Grafton, projected ridership for the Grafton Station, and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Grafton Station focused on the streets and intersections identified in the Certificate of the Secretary of Environmental Affairs. Figures 13.1-1 (A.M. Peak Hour) and 13.1-2 (P.M. Peak Hour) show the location of the streets and intersections that were analyzed as part of the study. Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection.

A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours as well as the A.M. and P.M. peak generator hours. The A.M. and P.M. peak hours are those periods when traffic conditions are heaviest. The A.M. and P.M. peak generator hours are those periods when usage of the rail station is heaviest. Traffic count data showed that the A.M. and P.M. peak hours in Grafton are from 7:30 to 8:30 A.M. and 4:45 to 5:45 P.M., respectively. The A.M. and P.M. peak generator hours are from 6:45 to 7:45 A.M. and 5:45 to 6:45 P.M., respectively.



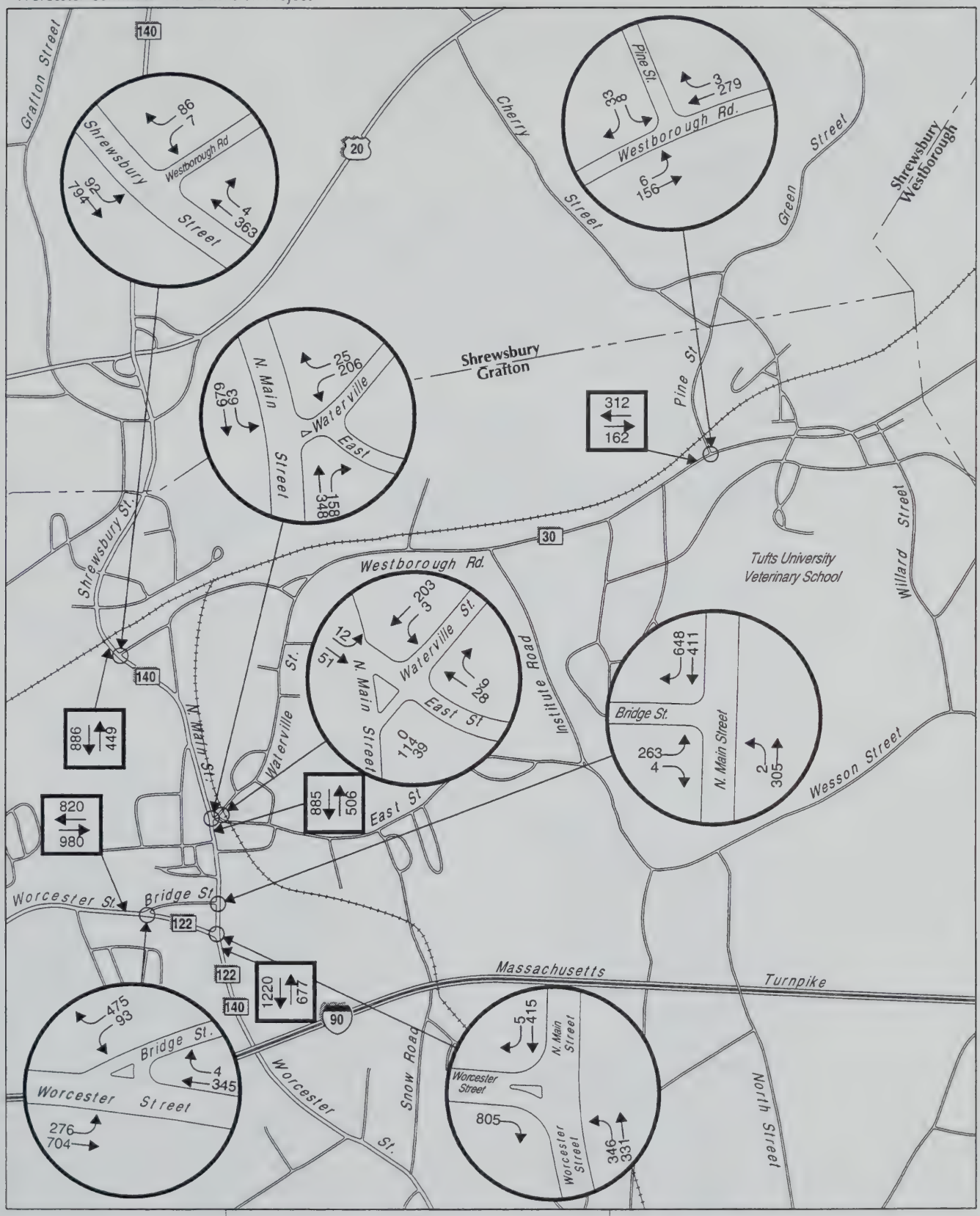
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

0 1750

AM Peak Hour
7:30 - 8:30 A.M.
1992 Existing Conditions
GRAFTON STATION

FIGURE 13.1-1



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

0 1750

PM Peak Hour
4:45 - 5:45 P.M.
1992 Existing Conditions
GRAFTON STATION

FIGURE 13.1-2

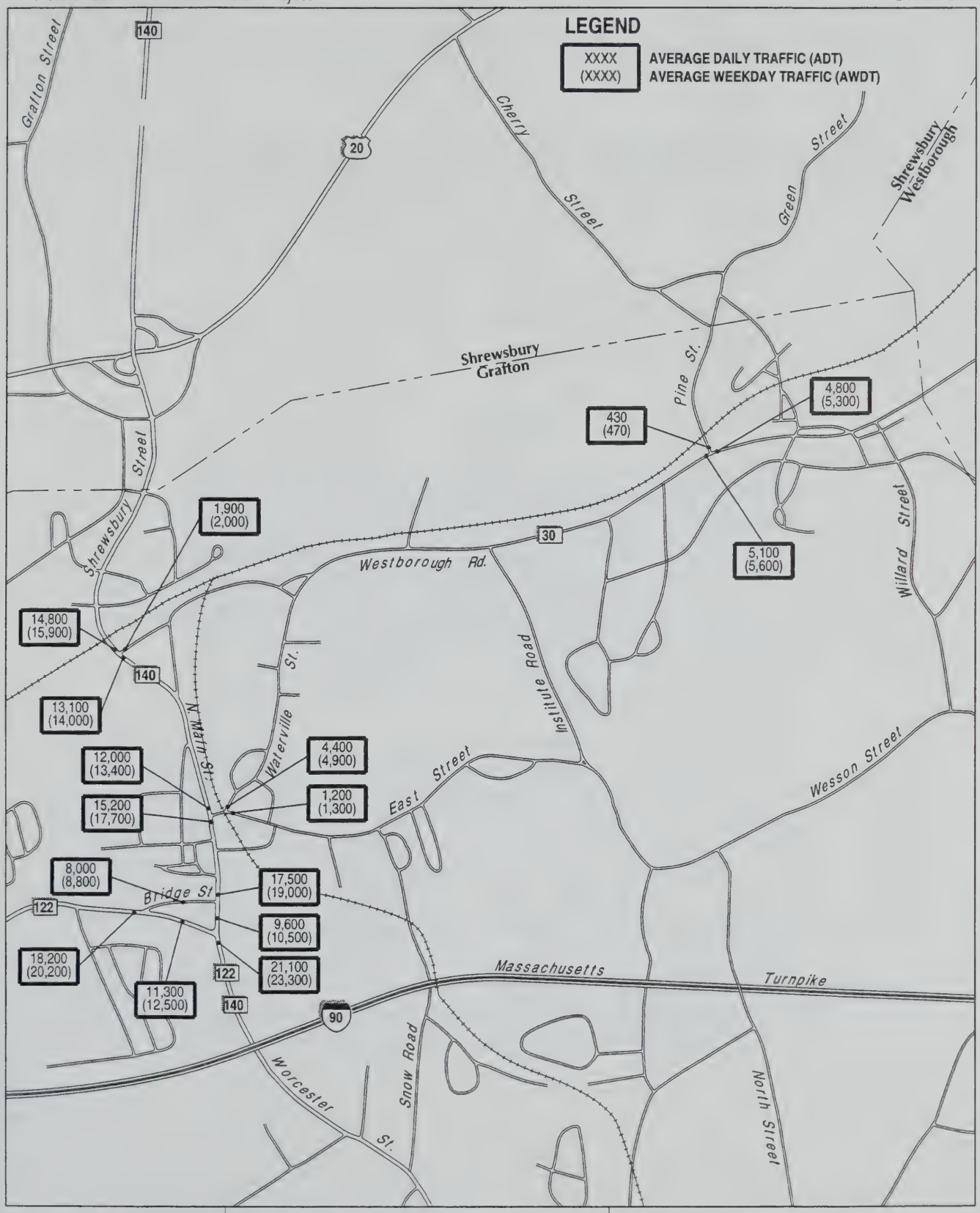
Existing Conditions

Existing conditions were determined by traffic counts and intersection turning movement counts conducted in the Fall of 1992 and the Spring of 1993. The results of the counts were used to calculate existing condition levels of service for each of the intersections and street segments studied. Figures 13.1-1 and 13.1-2 show existing A.M. and P.M. peak hour volumes within the study area. Figure 13.1-3 shows existing Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

Table 13.1-1 shows the unsignalized intersection levels of service and Table 13.1-2 shows the roadway segment levels of service.

Table 13.1-1 1992 Existing Unsignalized Intersection Level of Service

Grafton	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Shrewsbury and Westborough				
LT from SB Shrewsbury	B	A	A	A
LT and RT from Westborough	D	C	C	A
North Main and Waterville				
LT from SB North Main	B	A	A	A
LT and RT from Waterville	F	F	D	E
Waterville and East				
LT from NB Waterville	A	A	A	A
LT from SB Waterville	A	A	A	A
THRU and RT from WB East	A	A	A	A
LT and THRU from EB East	A	A	A	A
North Main and Bridge				
LT from NB North Main	A	B	A	A
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	C	A	B	A
LT from Bridge	E	F	E	D
RT from Bridge	A	A	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	B	A	B	A
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

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1992 Average Daily Traffic & 1992 Average Weekday Traffic
GRAFTON STATION

FIGURE 13.1-3

Table 13.1-2 1992 Existing Road Segment Level of Service

Grafton	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Route 30 West of Pine	C	C	C	C
Route 140 North of Westborough	D	D	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	E	D	E
Route 122/140 South of Bridge Street	E	E	E	E

The Grafton Police Department was contacted on June 21, 1994 to ascertain the existence and location of high frequency accident locations and other safety concerns. Chief Messier indicated two intersections were of particular concern: the intersection of Bridge Street at North Main Street, and the intersection of North Main Street at Worcester Street. Review of accident data supplied by the Police Department indicates that each of these intersections has an accident rate that is higher than the average for similar type intersections.

Rail Ridership Projections

Projections of rail ridership on each of the proposed stations of the Worcester Extension Project were prepared by the Central Transportation Planning Staff (CTPS) in May, 1994. The full CTPS ridership projections memo is included in the Appendix 2.0. The CTPS projected that in 1996 the Grafton Station would attract a total of 116 daily round trip commuters. None of these patrons would walk to the station and 9 are projected to be dropped off. The remaining 107 patrons will drive to and park at the station. Based on a vehicle occupancy rate of 1.12, the 107 Park'n'Ride patrons would result in a demand for 96 parking spaces.

The patrons of the Grafton Station are projected to originate from the towns of Grafton, Shrewsbury, Sutton, Boylston, and Northbridge. Table 13.1-3 shows the town of origin for the projected Grafton Station riders.

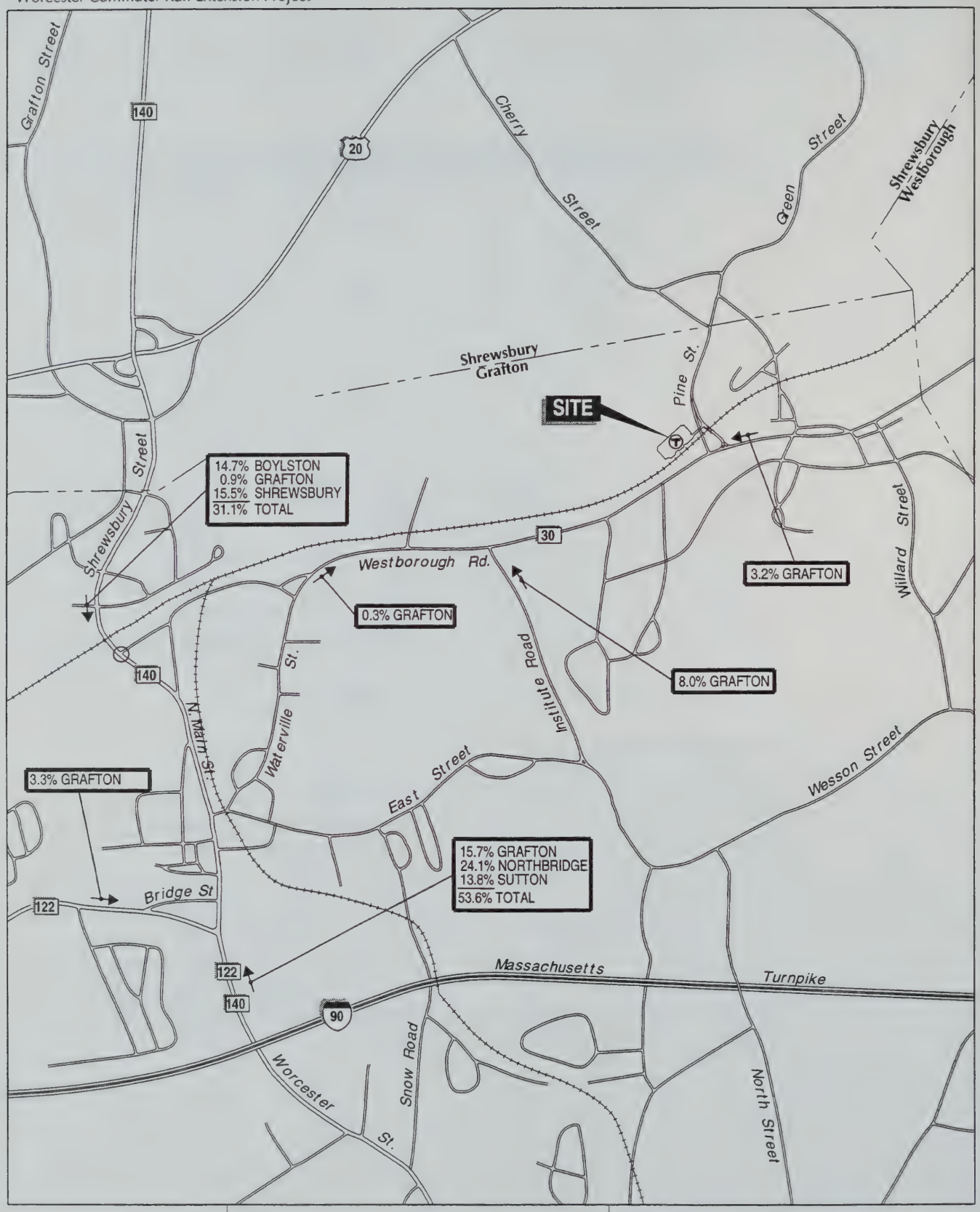
Table 13.1-3 Town of Origin Grafton Station Projected Ridership - Year 1996

Town	Riders
Grafton	37
Shrewsbury	18
Sutton	16
Boylston	17
Northbridge	28
Total	**116**

The impact of the commuter rail riders on area streets as they travel to the Grafton Station is determined by assigning those commuters to a particular route in the study area. Riders who live in Grafton would utilize a variety of travel routes depending on the location of their residence with some emphasis on Route 122/140 from the south. Shrewsbury and Boylston commuters would use southbound Route 140 to Westborough Road to Pine Street. Sutton and Northbridge residents would use northbound Route 122 and 140 to Waterville Street to Westborough Road to Pine Street. Figure 13.1-4 shows the projected distribution and percentage of station related traffic that would use Grafton area roadways.

Assignment of Riders to Trains

Commuter rail riders to the Grafton Station would arrive at the Pine Street Station to catch one of four A.M. peak period trains and would leave the station in the P.M. peak period based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several MBTA commuter rail lines. The observations of distribution by train tend to show the greatest number of riders on the trains arriving at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, the observations also show greater ridership in the middle of what is normally considered peak commuting period.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

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Distribution of Commuter Rail Station Traffic
1996 BUILD ALL STATIONS
GRAFTON STATION

FIGURE 13.1-4

1996 Traffic Impacts

The 1996 traffic impacts must also consider background growth of traffic in addition to existing traffic volumes and the new riders destined for the station. Background growth is usually determined by tracking historical growth rates of permanent count locations. During the 1980's, traffic grew at rates of 2 - 3% or more a year in many areas. Data from permanent count locations in the Grafton area showed mixed results including decreases in traffic volumes. As a conservative approach, 0.5% annual growth of traffic volumes was assumed from 1992 to 1996.

The traffic impacts of both a "No Build" and "Build" alternative were analyzed. The 1996 "No Build" alternative allows a comparison with the 1996 traffic impacts of building the commuter rail station. The "Build" alternative did not assume any redistribution of existing traffic on local roads. In other words, the commuters driving to the rail station were considered to be new trips. In actuality, many of those who would drive to the station are already on the road. Their trip will be shortened by driving to the station. In some cases, they are already driving on the same roads to access Route 9, for example, as they would to go to the new station. The "Build" analysis, therefore, does some double counting of vehicles and tends to be a worst case analysis.

The only anticipated change to the study area roadway network will occur at the North Main Street/Waterville Street/East Street intersection. The Massachusetts Highway Department (MHD) proposes to install a new traffic signal at this intersection. It is expected that the new signal will be in operation by 1996. Therefore, the intersection was analyzed as a signalized intersection for the 1996 conditions.

The peak hour and peak generator hour overlap by 15 minutes in the A.M. period. There is no overlap in the P.M. peak period. Both peak hour and peak generator hour conditions were analyzed to determine the greatest impact to area roadways.

Tables 13.1-4 through 13.1-7 present the results of the LOS analysis for both the signalized and unsignalized intersections. The tables reflect "No Build" and "Build" conditions for the peak hours and peak generator hours.

As indicated in the table no change in LOS is expected at either the signalized intersection or the unsignalized intersections due to traffic related to the commuter rail station. The signalized intersection will operate acceptably under both the "No Build" and "Build" conditions. The unsignalized intersection movements which operate at LOS F in the "No Build" condition will operate at LOS F in the "Build" condition.

Tables 13.1-8 and 13.1-9 show the LOS ratings for the road segments analyzed in conjunction with the proposed station.

As shown, the road segments generally operate at acceptable levels of service except for Route 140 north of Westborough Road which is projected to experience a reduction of LOS from D to E in the P.M. peak hour in 1996 "Build" condition.

Table 13.1-4 1996 Signalized Intersection Level of Service - A.M. Peak Hours

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 140 and Route 30 and East	B	B	B	B
Eastbound, East Street	D	D	C	C
Westbound, Waterville Street	D	D	C	C
Northbound	B	B	B	B
Southbound	A	A	A	A

Table 13.1-5 1996 Signalized Intersection Level of Service - P.M. Peak Hours

Grafton	P.M. Peak Hour		P.M. Generator Peak Hour	
	No Build	Build	No Build	Build
Route 140 and Route 30 and East	B	B	B	B
Eastbound, East Street	C	C	B	B
Westbound, Waterville Street	C	C	C	C
Northbound	B	B	B	B
Southbound	C	B	B	B

Table 13.1-6 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Shrewsbury and Westborough				
LT from SB Shrewsbury	B	B	A	A
LT and RT from Westborough	D	D	C	C
North Main and Bridge				
LT from NB North Main	A	A	A	A
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	C	C	B	B
LT from Bridge	E	E	E	E
RT from Bridge	A	A	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	C	C	B	B
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A

Table 13.1-7 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Shrewsbury and Westborough				
LT from SB Shrewsbury	A	A	A	A
LT and RT from Westborough	C	C	A	A
North Main and Bridge				
LT from NB North Main	B	B	A	A
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	A	A	A	A
LT from Bridge	F	F	D	D
RT from Bridge	B	B	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	A	A	A	A
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A

Table 13.1-8 1996 Road Segment Level of Service A.M. Peak Hours

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 30 West of Pine	C	C	C	C
Route 140 North of Westborough	D	D	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	D	E	E
Route 122/140 South of Bridge Street	E	E	E	E

Table 13.1-9 1996 Road Segment Level of Service - P.M. Peak Hours

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 30 West of Pine	C	C	C	C
Route 140 North of Westborough	D	E	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	E	E	E
Route 122/140 South of Bridge Street	E	E	E	E

1996 Traffic Impacts - Grafton Station Only

In order to address an upper limit, worst case situation with regard to traffic impacts on Grafton Streets, an analysis was performed which considered that the Grafton commuter station was the only commuter station built by 1996 (in addition to a Worcester Station).

CTPS projected that, under this scenario, the Grafton Station would attract 444 daily round trip patrons, 408 of which would be Park'n'Riders. Site traffic was distributed over the roadway network in a manner similar to that used for the 1996 analysis. The projected distribution is shown in Figure 13.1-5.

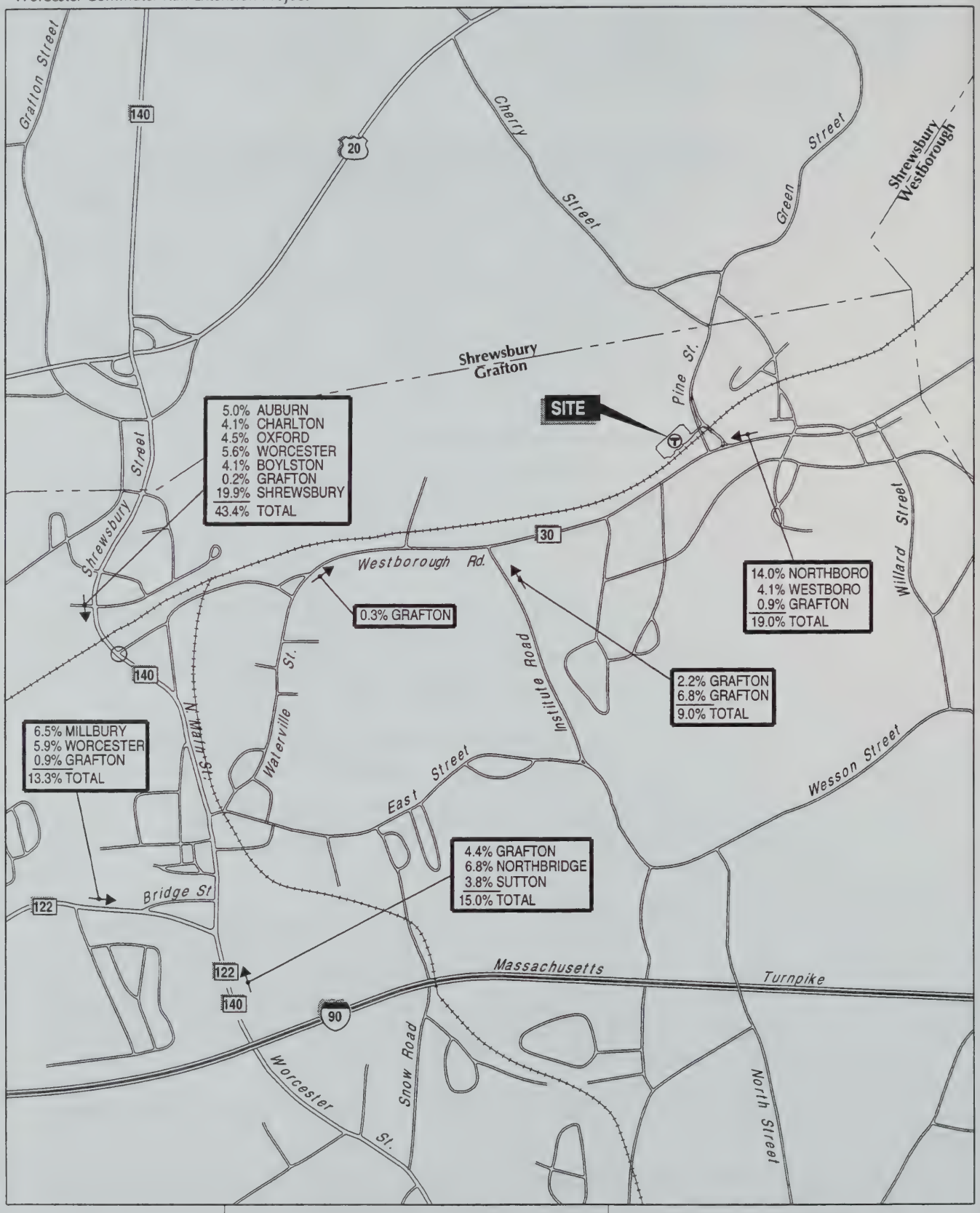
A LOS analysis was performed for the peak hour and peak generator hour "Build" condition. The "No Build" condition is the same as previously presented for the "Build All Stations" scenario.

Table 13.1-10 through 13.1-13 present the results of the LOS analysis for the signalized and unsignalized intersections.

The signalized intersection functions at an acceptable level of service under both the "No Build" and "Build" condition with only a minor reduction in LOS in the P.M. peak hour. Several unsignalized intersection movements experience minor reductions in LOS in the "Build" condition. These movements continue to operate acceptably. The movements that function at LOS F in the "No Build" condition continue at LOS F in the "Build" condition.

Table 13.1-14 and 13.1-15 show the results of the LOS analysis for the roadway segments.

Generally, the road segments function at acceptable levels of service. Minor reductions in level of service occur on two segments in the "Build" condition. However, these segments continue to operate acceptably.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

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Distribution of Commuter Rail Station Traffic
1996 BUILD GRAFTON ONLY
GRAFTON STATION

FIGURE 13.1-5

Table 13.1-10 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Grafton Station Only)

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 140 and Route 30 and East	B	B	B	B
Eastbound, East Street	D	D	C	C
Westbound, Waterville Street	D	D	C	C
Northbound	B	B	B	B
Southbound	A	A	A	A

Table 13.1-11 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Grafton Station Only)

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 140 and Route 30 and East	B	C	B	B
Eastbound, East Street	C	C	B	B
Westbound, Waterville Street	C	D	C	D
Northbound	B	B	B	B
Southbound	C	C	B	B

Table 13.1-12 1996 Peak Hour Unsignalized Intersection Level of Service - A.M. Peak Hours (Grafton Station Only)

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Shrewsbury and Westborough				
LT from SB Shrewsbury	B	C	A	B
LT and RT from Westborough	D	D	C	C
North Main and Bridge				
LT from NB North Main	A	A	A	A
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	C	C	B	C
LT from Bridge	E	E	E	E
RT from Bridge	A	A	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	C	C	B	B
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A

Table 13.1-13 1996 Peak Hour Unsignalized Intersection Level of Service - P.M. Peak Hours (Grafton Station Only)

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Shrewsbury and Westborough				
LT from SB Shrewsbury	A	A	A	A
LT and RT from Westborough	C	C	A	B
North Main and Bridge				
LT from NB North Main	B	B	A	A
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	A	A	A	A
LT from Bridge	F	F	D	D
RT from Bridge	B	B	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	A	A	A	A
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A

Table 13.1-14 1996 Road Segment Level of Service - A.M. Peak Hours (Grafton Station Only)

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 30 West of Pine	C	D	C	D
Route 140 North of Westborough	D	E	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	D	D	D
Route 122/140 South of Bridge Street	E	E	E	E

Table 13.1-15 1996 Road Segment Level of Service - P.M. Peak Hours (Grafton Station Only)

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 30 West of Pine	C	C	C	C
Route 140 North of Westborough	D	E	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	E	E	E
Route 122/140 South of Bridge Street	E	E	E	E

2001 Traffic Impacts

In addition to a small increase in commuter traffic between years 1996 to 2001 at the Grafton Station, background traffic growth was added at a rate of 1.5% per year. A future positive growth adjustment was made to allow for Phase I elements of Tuft's University and the Worcester Business Development Corporation biotech centers, planned for the south side of Route 30 and the west side of Pine Street, respectively.

CTPS projected that the Grafton Station is expected to attract 126 daily round trip commuters in 2001. Ten will be dropped off at the station and 116 will be Park'n'Riders. Distribution of traffic is essentially the same as shown in Figure 13.1-4.

A LOS analysis was conducted for the "No Build" and "Build" condition in both the peak hours and the peak generator hours.

The results of the LOS analysis for the signalized and unsignalized intersections are shown in Tables 13.1-16 through 13.1-19.

The signalized intersection will operate at an acceptable LOS under both the "No Build" and "Build" conditions; although the approach to East Street eastbound will function at LOS F in the P.M. peak hour in "No Build" and "Build." The majority of the unsignalized intersection movements operate at acceptable levels of service under both the "No Build" and "Build" conditions. The movements operating at LOS F in the "No Build" condition will operate at LOS F in the "Build" condition. Only one movement will experience a minor reduction in LOS.

Tables 13.1-20 and 13.1-21 present the results of the road segment LOS analysis.

As shown, no change in LOS will occur for the road segments between the "No Build" and "Build" conditions. The "Build" condition will result in some reduction in reserve capacity.

Table 13.1-16 2001 Signalized Intersection Level of Service - A.M. Peak Hours

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 140 and Route 30 and East	C	C	B	B
Eastbound, East Street	E	E	C	C
Westbound, Waterville Street	D	D	C	C
Northbound	B	B	B	B
Southbound	B	B	A	A

Table 13.1-17 2001 Signalized Intersection Level of Service - P.M. Peak Hours

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 140 and Route 30 and East	D	D	B	B
Eastbound, East Street	F	F	B	C
Westbound, Waterville Street	E	E	C	C
Northbound	B	B	B	B
Southbound	D	D	B	B

Table 13.1-18 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Shrewsbury and Westborough				
LT from SB Shrewsbury	C	D	B	B
LT and RT from Westborough	E	E	C	C
North Main and Bridge				
LT from NB North Main	A	A	A	A
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	D	D	C	C
LT from Bridge	E	E	E	E
RT from Bridge	B	B	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	C	C	B	B
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A

Table 13.1-19 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Shrewsbury and Westborough				
LT from SB Shrewsbury	A	A	A	A
LT and RT from Westborough	D	D	B	B
North Main and Bridge				
LT from NB North Main	C	C	A	B
LT and RT from Bridge	F	F	F	F
Worcester and Bridge				
LT from SB Worcester	A	A	A	A
LT from Bridge	F	F	E	E
RT from Bridge	C	C	A	A
North Main and Worcester				
THRU from SB North Main	F	F	F	F
RT from SB North Main	A	A	A	A
Westborough and Pine				
LT from EB Westborough	A	A	A	A
LT and RT from Pine	A	A	A	A

Table 13.1-20 2001 Road Segment Level of Service - A.M. Peak Hours

Grafton	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 30 West of Pine	D	D	C	C
Route 140 North of Westborough	E	E	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	E	E	E
Route 122/140 South of Bridge Street	E	E	E	E

Table 13.1-21 2001 Road Segment Level of Service - P.M. Peak Hours

Grafton	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 30 West of Pine	D	D	C	C
Route 140 North of Westborough	E	E	D	D
Route 140 South of Route 30	E	E	E	E
Route 122 West of Bridge	E	E	E	E
Route 122/140 South of Bridge Street	E	E	E	E

Summary of Findings

The traffic analysis shows that generally the streets and intersections studied in Grafton currently operate at acceptable levels. The exceptions are for traffic turning from Waterville Street (Route 30) to North Main Street (Route 140), traffic turning from Bridge Street to North Main Street (Route 140) and for southbound through traffic on Route 140 south of Bridge Street. The installation of a proposed traffic signal by the Massachusetts Highway Department at the Waterville Street/North Main Street intersection should improve traffic flow at this location.

The analysis indicates that the addition of traffic attributable to the proposed Grafton Station will not result in any significant adverse impacts on the study are roadway network. For both years 1996 and 2001, the analysis shows no significant change in levels of service for the signalized and unsignalized intersections and the roadway segments.

Review of preliminary accident data reveals higher than expected accident rates at the North Main Street/Bridge Street intersection and the North Main Street/Worcester Street intersection. The small volumes of station traffic added to these intersections are not expected to contribute to increased accidents. Improvements that could enhance traffic flow at these locations are discussed in Section 13.12.

13.2 Air Quality

Employing the rationale and methodology described for the Millbury Route 122 Station analysis, the intersection of Route 140 (North Main Street) and Route 30 (Waterville Street) and East Street was selected for analysis (see Figure 13.1-1).

Although the intersection is presently unsignalized, a traffic signal will be installed in late 1994 or early 1995. All traffic analyses for the year 1996 were performed with the signal in place. The intersection exhibits the traffic volumes and queued traffic which was determined to produce the highest CO concentrations.

In order to produce the highest CO concentrations, receptor locations were established along the sidewalk areas nearest to the traffic lanes. On the southerly side of the intersection, the sidewalks evaluated are on the west across from the variety store and on the east in front of the store. On the northerly side of the intersection, the sidewalk in front of the service garage was evaluated. The results for the year 1996 are as follows in Table 13.2-1.

Table 13.2-1 1996 CO Concentrations - Route 140/Route30/East Street Intersection, Grafton

	1-Hour CO (ppm)		8-Hour CO (ppm)	
	No Build	Build	No Build	Build
Southwest Sidewalk	5.0	5.1	3.5	3.6
Southeast Sidewalk	5.9	6.0	4.1	4.2
Northeast Sidewalk	7.9	7.9	5.5	5.5

The predicted CO concentrations are the same or nearly the same for the "No Build" and "Build" conditions, for both the 1-hour and 8-hour periods. All values are well below the 35 ppm for the 1-hour standard and 9 ppm for the 8-hour standard. Additional receptors evaluated included 4 single-family residences, the variety store/apartment building and the service garage. The predicted CO concentrations for the 1-hour case range from 3.7 ppm for "No Build" to 5.1 ppm for the "Build" condition. Similarly the 8-hour values range from 2.6 ppm to 3.6 ppm. Most predicted concentrations are the same or only slightly higher for "Build" versus "No Build". There are no other Grafton intersections affected by station generated traffic that would exhibit higher CO concentrations.

13.3 Noise and Vibration

Noise Impact Analysis Methodology

Because of slow train speeds near stations, the potential for noise and vibration impacts from train operations are at a minimum compared to other segments of the right-of-way. There is, however, the potential of effects on the noise and vibration environment in the vicinity of the station because of project-induced traffic on roads leading to and from station areas, as well as short-term effects during construction of platforms, parking and other site facilities.

Traffic Noise

The significance of noise impacts from project-generated traffic near proposed commuter rail stations along the corridor was assessed based on the projected noise increase relative to the noise from existing traffic on applicable roads. Because the greatest changes in traffic volumes are expected to occur during peak commuting periods, the noise increase was evaluated in terms of the peak-hour L_{eq}.

Criteria for traffic noise impact are based on existing FTA guidelines, and state that a noise level increase of greater than 5 dBA is considered to represent impact. The existing FTA criteria are used here rather than the proposed FTA criteria used in the train noise assessment because of the general, non-site specific nature of the traffic noise impact assessment. Where the existing layout of major roads will essentially remain the same, the traffic noise assessment predicts only the change in noise resulting from the projected change in traffic volumes near the stations, and not the absolute traffic noise levels at specific noise-sensitive locations in the community.

The traffic noise analysis was carried out on a relative basis, by estimating the change in peak-hour traffic noise, which is a function of the change in peak-hour traffic volume. The assumption is that all other non-project related noise sources remain unchanged.

Construction Noise and Vibration

The construction of a fixed facility such as a commuter rail station is expected to include clearing, excavation, foundation work, equipment installation, paving and finishing. Construction machinery is likely to include the types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes and trucks. Construction will typically occur during 8 to 10 hour weekday, daytime periods.

Construction of the station can be categorized in two distinct operations—parking lots and platform areas—with total duration of construction estimated to be approximately eight months.

For a typical station site, the distance to significant noise impact was estimated to be 200 feet measured from the closest area of construction. In cases where noise-sensitive land uses were concentrated in a location very close to either the platform area or the parking area, separate screening distances were used to assess the two construction scenarios.

Station construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Usage factors were assigned to each piece of equipment to determine a cumulative reference noise level to use in determining the width of the noise impact zone.

Noise impact criteria for construction are based on the outdoor Annual Average Day-Night Equivalent Sound Level (AA L_{dn}), with a threshold of 65 AA L_{dn} defining the impact zone. This metric is slightly less conservative than the 24-hour L_{dn} used for train noise impact, given the short-term nature of construction noise impact. (A complete definition of metrics and terms pertaining to noise and vibration used in this report are given in Appendix, Volume II, Section 3.0).

The impact criteria for construction vibration are essentially the same as for train operations, except that impact is assessed only when the activity will occur for 30 days or more at a given location. Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990) . Vibration projections were made for the main equipment categories, based on the relative amount of energy imparted to the ground. Details on this methodology are given in Appendix 3.0. A screening distance of 85 ft measured from nearest area of construction was estimated for vibration impact from general construction activity at stations.

Traffic Noise Impacts

For Grafton Station, there are two residences to the west of the station site, located 30 ft and 70 ft, respectively, south of the centerline of Westborough Road (Route 30). Other surrounding land use includes the Tufts University School of Veterinary Medicine, also located south of Route 30.

No additional roads are proposed to be built to access the station; therefore, a relative increase in traffic noise is sufficient for evaluating noise impact. The peak-hour traffic volume on Route 30 is projected to increase by a factor of 1.1,

resulting in a less than 1 dBA increase in peak-hour L_{eq}. Hence, no noise impact is projected for noise-sensitive buildings near the Grafton Station site.

Construction Noise and Vibration Impacts

One home on Westborough Road is projected to be exposed to both short-term noise and vibration impact from station construction. At the Grafton site, blasting may be required to construct the station platform and pedestrian bridge, particularly on the south side of the railroad.

For blasting, airborne sound levels depend to a great extent on the amount, depth and distribution of the explosive charge as well as on the local atmospheric conditions and the efforts of the contractor to cover the blast area with protective mats. In well-protected blasts, the sound is minimal and the ground-borne vibration is often the more noticeable disturbance. The level of vibration depends also on the charge weight and proximity as well as on local geologic conditions.

Rough estimates of the airblast overpressure and the ground vibration peak particle velocity from blasting operations can be made when both the charge weight per delay and the distance between the blasting and the receiver are known. Because these parameters are unknown at present, specific projections cannot be made prior to the design phase of the project.

Traffic Noise Mitigation

No significant traffic noise impact was identified for the Grafton station.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures can be implemented:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers, and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

During the project design phase, specific construction noise will be developed and incorporated into the contract specifications, along with requirements for noise monitoring to certify compliance with the specified limits.

All of the potential vibration impacts from construction identified are related to annoyance effects and not to building damage effects, and will occur only during daytime hours. Following are some procedures that can be used to minimize the potential for annoyance from construction vibration:

- Restrict procedures that contractors can use in vibration-sensitive areas, and specify alternative techniques that generate lower vibration levels.
- Restrict the hours of vibration-intensive activities and the use of heavy-duty equipment to weekdays during daytime hours.
- Require vibration monitoring during vibration-intensive activities, especially blasting.

The Contractor must take into consideration the abutting properties when developing the blasting program. Providing advance notice of blasting to butters can serve to alleviate potential annoyance and disruption.

13.4 Site Drainage

The proposed Grafton Station Site lies within the Blackstone River watershed. The area currently consists of both open meadow and wooded area. Subsurface soils include well drained fine sandy loam. Rock outcrops and boulders are evident throughout the site.

The majority of the site drains in a northerly and easterly direction, to the adjacent wetland system. Stormwater then flows in an easterly direction under Pine Street, then in a southerly direction under the railroad tracks and under Westborough Road (Route 30) where it connects to Axtell Brook. Axtell Brook flows in a southerly direction to Lake Ripple and connects to Quinsigamond River at a point approximately two miles south of Route 30. Quinsigamond River also flows in a southerly direction into Fisherville Pond for an additional two miles before discharging into the Blackstone River.

The proposed commuter rail station will include 250 paved parking spaces, ramps, stairs, train platforms, landscaping and associated stormdrain systems. Pine Street and

the Pine Street Bridge will be widened and reconstructed from the Route 30 intersection to a point 400 feet north of the bridge. A sidewalk will be constructed from the new parking lot, along the reconstructed bridge and extending to Route 30. A 250 foot long driveway will connect the station to Pine Street. A retaining wall will be constructed along the northerly side of the driveway in an effort to minimize wetland alterations.

The project will implement Best Management Practices (BMPs) in order to minimize and mitigate any stormwater related impacts created by the proposed project. BMPs will include a parking lot sweeping program and catch basins equipped with sumps and oil & grease traps. One objective of a sweeping maintenance program is to remove as many contaminants as possible from the parking lot surfaces before they are washed into the stormwater collection system. Studies have determined that a large percentage of contaminant loads are bound to particulates (silt and sand particles) and thus a regular sweeping program will be effective in reducing pollutant loadings and improving runoff water quality. Cleaning of catch basins will remove additional coarse sediment and large debris from the stormdrain system. In addition to reducing sediment loads, catch basins cleaning will also reduce the load of oxygen-demanding substances which could reach downstream surface waters. General maintenance of the station will also include removal of trash and organic debris (leaves, branches, etc.). This will reduce not only loadings of nutrient related contaminants, but also will help to keep the stormdrain system clear and working properly.

Sodium chloride (salt) is typically the main chemical used for de-icing roads, sidewalks and parking lots. Alternatives to salt will be considered and discussed with the Town during the advanced stages of design.

The proposed stormwater management system for the station includes a stormwater detention pond to mitigate any increase in peak flow rates generated by the station. The detention pond will be sized to accommodate stormwater runoff generated by storms up to and including the 100 year event. An outlet control structure will be designed to release stormwater at a controlled rate which will not exceed existing conditions for both the 10 and 100 year events. Table 13.4-1 indicates the estimated peak stormwater flow rates for the station site under existing and proposed conditions. The table shows that the peak flows will not exceed existing conditions. The supporting watershed mapping and TR-55 analysis with computer modelled hydrographs are included in Appendix Volume II, Section 5.

Table 13.4-1 Peak Runoff Rates Grafton Station

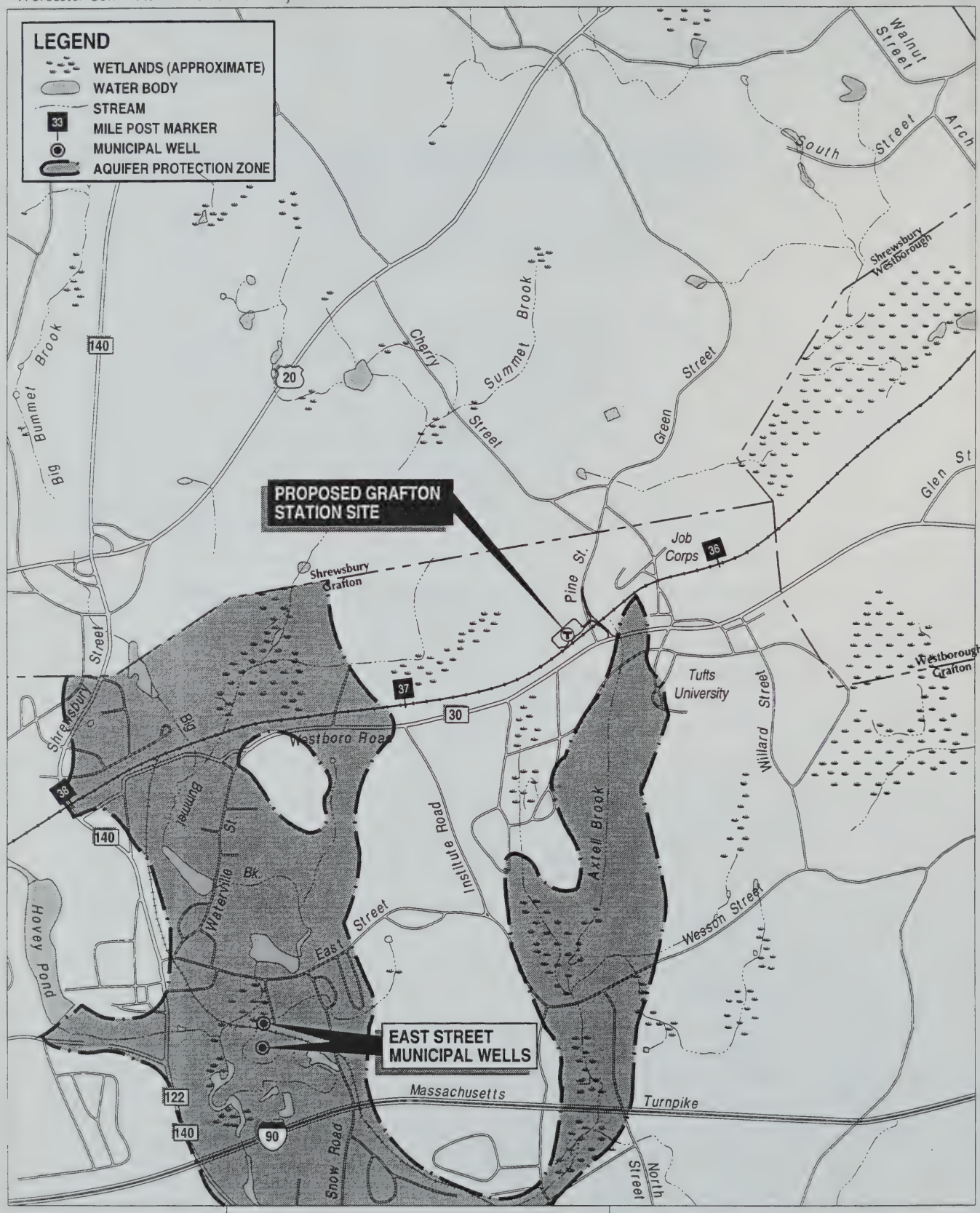
Storm Event	Existing Conditions	Proposed Conditions
10 Year	4.9 cfs	3.7 cfs
100 Year	10.0 cfs	5.6 cfs

The peak runoff rates and time of concentration values were utilized in a TR-20 computer modelled hydrograph program. The resultant peak discharge rates closely resembled those generated with the TR-55 method. The graphical hydrographs provide a convenient method to analyze pre and post construction rates of runoff. The benefit of providing the detention basin becomes apparent when evaluating the lag period between inflow and outflow peak rates. Not only has the peak rate been reduced, but also the time of concentration has been increased by approximately 23 minutes. This allows more contact time within the detention basin which enhances water quality.

The discharge point for the detention pond is the adjacent wetland area described under Wetland Areas 4 and 5 in Section 7.4. The proposed detention pond will include a permanent wet pond approximately 0.1 acre in area and 4 feet deep. The wetpond area will be planted to support a cattail marsh, one of the most effective means of treating urban runoff. Detention basins achieve pollution attenuation primarily by settling out particulates and their associated contaminants. Detention ponds which support wetland vegetation are also very effective in removing dissolved contaminants such as nitrogen and phosphorous. At the proposed Grafton station, stormwater runoff from the paved areas will displace treated water in the wet pond that has flowed through the cattail marsh before discharging to the existing wetlands. A Vegetative Management Plan (VMP) will be discussed with the Grafton Conservation Commission to ensure that overgrowth will not displace necessary storage volume within the basin.

Water Supply

The Town has public groundwater wells located on East Street and Worcester Street, south southwest of the station site. The aquifer protection overlay zone, shown on Figure 13.4-1, includes the East Street wells and extends to an area just east of the station site but does not include the station site. Stormwater drainage from the station site will be detained on site as part of the Best Management Practices (BMPs) developed for the site. The Worcester Street well, and Lake Ripple located along Axtell Brook more than a mile from the proposed station, are not expected to be impacted by the drainage alterations.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

0 2000

WATER SUPPLY PROTECTION OVERLAY DISTRICT TOWN OF GRAFTON, MA

FIGURE 13.4-1

13.5 Wetlands and Wildlife

Wetlands

Wetland resources on the site are associated with headwaters to Summet Brook to the west and to Axtell brook to the south. A watershed divide is located within the site. Wetlands within the project area include the wooded wetland area to the west of Pine Street, north of the proposed station (Area 4 on Figure 7.4-2), and the wetland area east of Pine Street, north of the railroad (Area 5 on Figure 7.4-2). The wetland resources to the west of Pine Street were reviewed by the Grafton Conservation Commission in 1991, as part of a Request for Determination of Applicability by the Massachusetts Division of Capital Planning and Operations. The site does not lie within any flood plain area as identified on the Flood Insurance Rate Map (FIRM) for the Town of Grafton, community-panel number 250306 0001 D, Map Revised September 30, 1992.

The station parking lot and detention area will be within the 100 foot buffer zone of wetland resources. The lot and access driveway have been configured to minimize impacts on wetlands to the west of Pine Street. The access road from Pine Street to the station will require the filling of approximately 370 square feet of the BVW referred to as Wetland Area 4. Stormwater will not be directly discharged into the wetland resource, but through the detention basin system for the station discussed in Section 13.4.

The dominant feature of the wetland area to the east of Pine Street is a skunk cabbage vegetation area bordered by a tree and shrub community that appears to have been modified by the initial construction of the rail bed. A bermed area along the railroad separates the wetland from the railbed and directs stream flow to a small culvert under the railbed. The wetland area adjacent to the toe of slope east of Pine Street (Wetland #5) will be altered by the relocation and widening of Pine Street by the Massachusetts Highway Department; however the impact will be minimized to the extent possible and altered wetlands will be replicated. Coordination with the Grafton Conservation Commission will be continued throughout the final design process for the station site, the road realignment and bridge reconstruction.

13.6 Historic Properties/Sites

There are three structures near the proposed Grafton Station site for which architectural survey forms will be completed. See Section 7.8 for a description of Grafton's potentially historic properties.

13.7 Archaeological Resources

As part of the EIR process, the MBTA has undertaken a reconnaissance archaeological and cultural resources survey for the Grafton Station site. An archaeologist also was present at the Grafton Station site during the excavations that were necessary as part of the hazardous materials (Chapter 21E) investigation. The location of the proposed Grafton station is on a gently sloping height of land through which the existing rail bed cuts. A small area of wetland vegetation occurs just north of the station area, while the more extensive wetlands of Axtell Brook lie 150-300 m. away. The proposed station area provides no obvious indication of disturbance, other than the existing rail bed and cut. According to these characteristics, the proposed Grafton station area possesses a moderate-to-high probability of containing prehistoric sites. As a component of the preparation of the FEIR, an intensive archaeological survey will be conducted to determine if potentially significant archaeological resources are present at the site.

13.8 Visual Impacts

Due to the location of the site adjacent to a depressed section of tracks, the station and the elevated pedestrian overpass will not be highly visible. The design will be compatible with the intended use for arriving and departing commuters and consistent with the design standards Grafton will require in its Office and Light Industrial District.

The overpass will be reached by covered stairways and access ramps from both the north and south sides of the tracks. Because of topographic considerations, the access ramps on the north side of the tracks will be a straight run of about 135 feet without any switchbacks or double ramps. From the parking level, one ramp will go down to the north side platform and the other will go up to the overpass. The overpass will

clear the tracks by 21 feet and have a total height of about 30 feet above the tracks when the canopy is added.

There will be a platform canopy about 150 feet in length and 15 feet in height to protect waiting commuters on the in-bound or south side of the tracks.

The parking area on the north side of the tracks will have landscaping on the periphery and between the station platform and the parking area.

The lighting is not expected to be an adverse influence. The existing nighttime light environment includes extensive lighting associated with the buildings on Tufts University Campus and the JobCorps facility. Cost-effective high pressure sodium light fixtures on 30 foot poles will be used in the parking lot. The lights will be of the cut-off type to minimize spillover to adjoining properties. Lighting will be turned on by photoelectric cells at dusk and turned off by the time clock approximately 30 minutes after the last evening train. There are no nearby houses and due to a combination of road alignments, as well as topography and zoning, no residential development is expected.

13.9 Hazardous Materials

An environmental site evaluation was performed for the proposed Grafton Station site. The purpose of the evaluation was to determine whether hazardous material or oil may be contained in the soils or groundwater at the site, within the meaning of Massachusetts General Laws, Chapter 21E (21E). The purpose of 21E and its implementing regulations (310 CMR 40.00 - The Massachusetts Contingency Plan) is to "ensure the protection of health, safety, public welfare, and the environment by establishing requirements and procedures for the discovery, notification, assessment of, and response to, releases and threats of releases of oil or hazardous materials, and by identifying these oils and hazardous materials which are subject to these requirements and proceedings."

The environmental site evaluation consisted of the following elements:

1. A review of the site's history, which indicated that the site has been vacant and undeveloped land and pastures since the early 1700s, and has been owned by the Commonwealth of Massachusetts since that time.

2. A review of state and local records which indicated no record of any spills/releases of hazardous materials or oil on the site or on properties within ¼ mile of the site.

3. A subsurface exploration program consisting of four soil borings, five test pits, and one monitoring well. Soil samples were taken from each of the borings and test pits. Figure 13.9-1 shows the location of wells and soil borings. Groundwater samples were taken at the monitoring well and at each of the test pits. The soil boring and test pit logs are available at the MBTA project office.

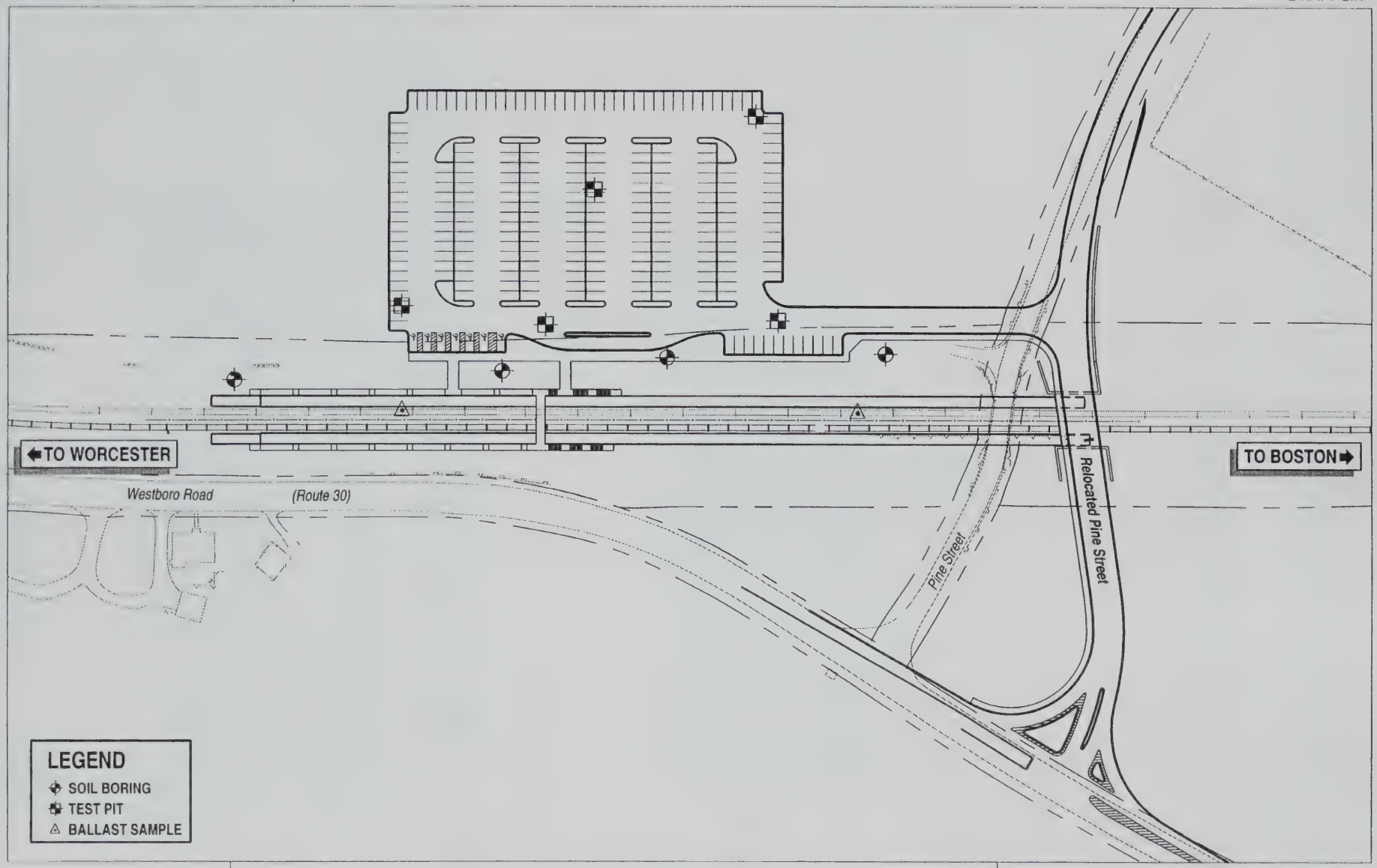
4. Soil and groundwater samples were analyzed in a laboratory by chemical screening methods.

The environmental site evaluation indicates the presence of trace concentrations of acetone and freon and levels of cadmium above expected background levels in the soil at the site. These concentrations of detected contaminants, however, are below the reportable concentrations established in the Massachusetts Contingency Plan. More specifically the environmental site evaluation results indicated the following:

- Results of the total volatile organic compound screening of soil did not detect organic compounds in the 32 of the 35 soil samples analyzed. Trace levels (less than 14 parts per billion) of acetone and freon were detected in the surface soil sample from one boring. The source of the detected contaminants is unknown.

- No pesticides, herbicides, or Resource Conservation and Recovery Act 8 metals above background levels were detected in the composite surface soil sample collected at the site, with the exception of low levels of cadmium.

- No volatile organic compounds were detected in the three groundwater samples collected at the site. Results of the analyses of pH and specific conductance detected pH and specific conductance readings typical for New England groundwater in three of the groundwater samples.



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Approx. Scale: 1" = 125'
0 125

SITE PLAN - HAZARDOUS MATERIALS INVESTIGATION (21E) GRAFTON, MA

FIGURE 13.9-1

- Polychlorinated biphenyls were not detected in the composite ballast sample collected from the railroad bed in the area of the proposed platform at the site. However, petroleum hydrocarbon concentration, 13 parts per million of motor/lubricating oil, was detected in this sample.

13.10 Pedestrian Safety

The CTPS ridership projections do not forecast any patrons walking to the Grafton Station; however, with the linkage between Tufts facilities in Grafton and Boston, some pedestrian traffic could occur between the station and the Tufts facility. Development of the industrial park northerly of the station could lead to future pedestrian traffic as well. Sidewalks will be provided on the station access road and along the reconstructed alignment of Pine Street. Provision of the sidewalk along Pine Street would accommodate the occasional patron who was dropped off at Route 30.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge, accessible to the handicapped, will be constructed over the tracks to connect station platforms to parking facilities.

13.11 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation,and safety. Station site work will involve clearing, excavation, foundation construction, paving and installing/erection of site facilities such as pedestrian bridges and station canopies. Construction equipment likely to be used includes graders, bulldozers, backhoes, cranes and trucks.

Construction related traffic impacts are not expected to be significant. During certain short-term phases of construction, there will be concentrated deliveries of materials, such as during paving of the parking areas. Station construction will not be particularly labor-intensive, either, and traffic generated by the labor force will not adversely affect level of service on nearby roads.

There will be short-term, intermittent increases in emissions from construction equipment and site-related construction traffic. No violations of air quality standards are anticipated.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of an order-of-conditions issued by the Grafton Conservation Commission will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise and vibration impacts and possible mitigation are described in the preceding Section 13.3.

Station site construction activities that present a potential safety concern would be secured by temporary fencing or other barriers. The Contractor will be required to adhere to all pertinent regulations regarding use and storage of hazardous or toxic materials on the site.

13.12 Proposed Mitigation and Mitigation Options

The results of the traffic analyses of the streets and intersections in the Grafton study area were reviewed to identify locations which may require mitigation in accordance with the MBTA Mitigation Policy outlined in Section 3.7.

Station generated traffic will not cause any study area street or intersection to deteriorate from an acceptable level of service to an unacceptable level of service. Side street traffic at two intersections, North Main Street/Bridge Street and North Main Street/Worcester Street, has unacceptable levels of service (LOS F) in the "No Build" condition. Station traffic will marginally increase delays at these intersections in the "Build" condition. While the effect of station traffic is minimal, the locations were reviewed to determine improvements necessary to bring level of service to acceptable limits.

Signalization of both intersections would be required. However, signalization alone would not solve the capacity problems at these locations. Construction of turning lanes would be necessary to obtain acceptable levels of service.

At the intersection of North Main Street and Bridge Street construction of a right turn only lane would be required for southbound North Main Street traffic. This would involve widening or replacement of the existing bridge on North Main Street. Land takings might also be required.

At the North Main Street/Worcester Street intersection construction of a right turn only lane for northbound traffic would be necessary. This would likely involve some land takings.

Impacts associated with improvements to these intersections include land acquisition, major rehabilitation or replacement of an existing bridge, new signalization and probable drainage impacts.

SECTION 14.0 ENVIRONMENTAL IMPACTS—WESTBOROUGH STATION

The proposed commuter rail station in Westborough will be constructed on Smith Valve Parkway, west of Otis Street, and on the north side of the railroad. In addition to the standard station amenities, parking will be provided for 300 vehicles. The site plan is shown on Figure 14.0-1

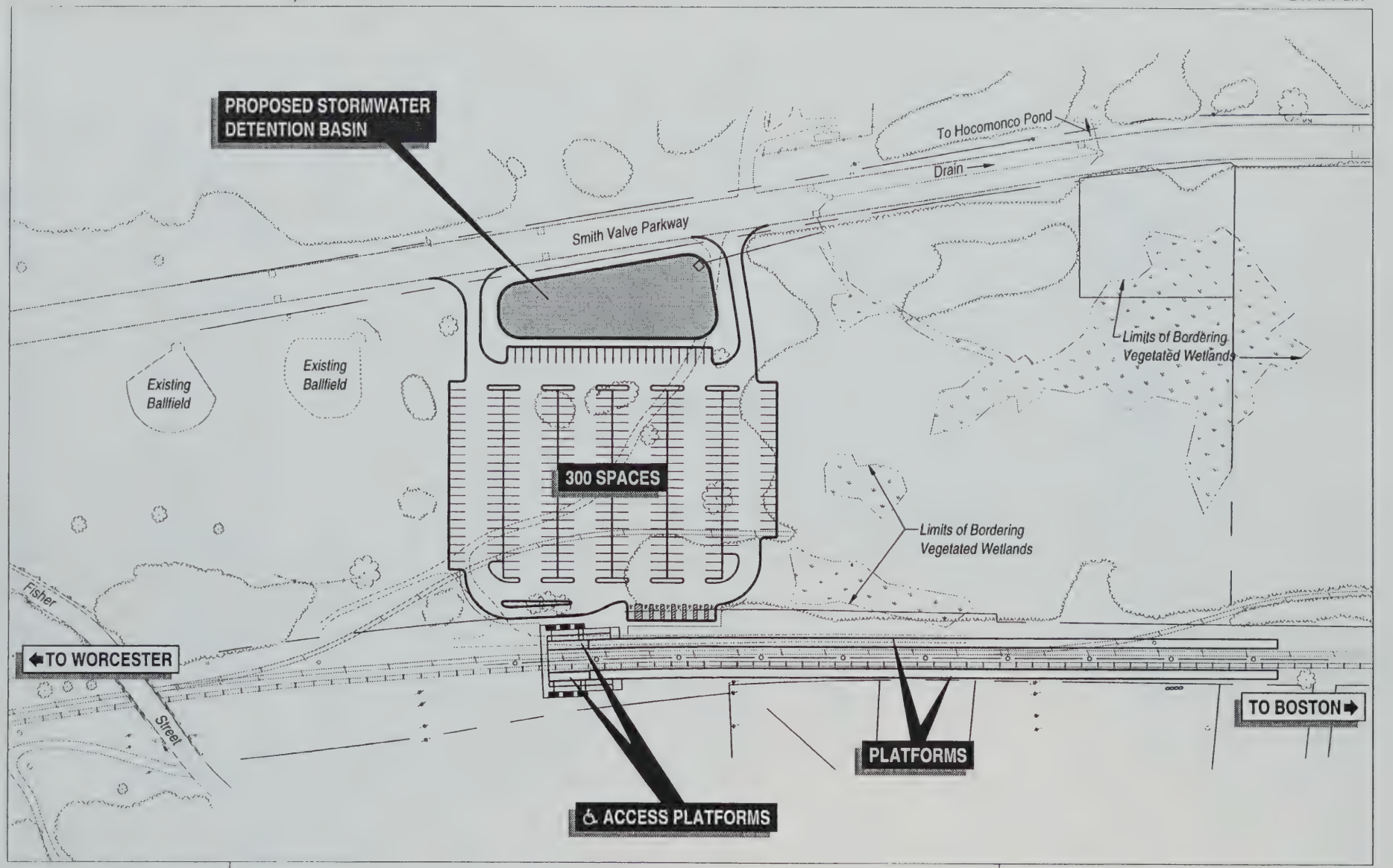
The Westborough station is projected to attract 216 patrons in 1996, with daily ridership increasing to 263 by the year 2011.

The streets and intersections within the Westborough study area operate at acceptable levels of service under the "No Build" and "Build" conditions for both year 1996 and year 2001 scenarios. Some reduction in level of service is expected for Smith Valve Parkway traffic turning onto Otis Street and Mill Road traffic turning onto Fisher Street. However, the intersections will function acceptably during all peak periods.

The signalized intersection of Route 9 and Otis Street shows signs of declining operating LOS on some approaches in the existing condition. It is expected that this would continue with or without the proposed rail station due to normal background traffic growth. To alleviate this situation, the Massachusetts Highway Department has proposed improvements to increase capacity on Route 9. With the proposed improvements, which are expected to be in place by 1996, the intersection will function at acceptable levels of service in both the "No Build" and "Build" conditions.

Three residences on Fisher Street south of the station site will be subject to temporary construction noise impact.

The proposed station site stormdrain system will mitigate increases in peak runoff rates by construction of an on-site detention basin, which will discharge into the existing closed drainage systems on Smith Valve Parkway. The parking lot will be within the 100 foot buffer zone, but no wetland resources will be displaced. Final design elements will be coordinated with the Westborough Conservation Commission.



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Approx. Scale: 1" = 150'

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SITE PLAN
WESTBOROUGH, MA

FIGURE 14.0-1

The Hocomonco Pond Superfund Site is located one eighth mile from the station site. The environmental evaluation of the station area produced no evidence that would indicate that contaminants from the Hocomonco Pond site have impacted the commuter rail station site.

14.1 Local Traffic

This section provides a summary of the complete traffic analysis included in Appendix, Volume I, Section 1.0. This section summarizes existing traffic conditions in Westborough, projected ridership for the Westborough Station, and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Westborough Station focused on the streets and intersections in the Certificate of the Secretary of Environmental Affairs. Figures 14.1-1 (A.M. Peak Hour) and 14.1-2 (P.M. Peak Hour) show the location of the streets and intersections that were analyzed as part of the study.

Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection. A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours as well as the A.M. and P.M. peak generator hours. The A.M. and P.M. hours are those periods when traffic conditions are heaviest. The A.M. and P.M. peak generator hours are those periods when usage of the rail station is heaviest. Traffic count data showed that the A.M. and P.M. peak hours in Westborough are from 7:30 to 8:30 A.M. and

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Approx. Scale: 1" = 2250'
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AM Peak Hour
7:30 - 8:30 A.M.
1992 Existing Conditions
WESTBOROUGH STATION
FIGURE 14.1-1

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2250'
0 2250

PM Peak Hour
4:45 - 5:45 P.M.
1992 Existing Conditions
WESTBOROUGH STATION

FIGURE 14.1-2

4:45 to 5:45 P.M., respectively. The A.M. and P.M. peak generator hours are from 7:00 to 8:00 A.M. and 5:45 to 6:45 P.M., respectively.

Existing Conditions

Existing conditions were determined by traffic counts and intersection turning movement counts conducted in the Fall of 1992 and the Spring of 1993 and 1994. The results of the counts were used to calculate existing condition levels of service for each of the intersections and street segments studied. Figures 14.1-1 and 14.1-2 show existing A.M. and P.M. peak hour volumes within the study area. Figure 14.1-3 shows existing Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

Table 14.1-1 and 14.1.2 present the results of the LOS analysis for the signalized and unsignalized intersections, respectively. Table 14.1-3 shows the results of the road segment analysis.

As the tables indicate, both the signalized intersection at Route 9 and Otis Street and all the unsignalized intersections operate at acceptable levels of service in both the peak hours and the peak generator hours.

A review of Table 14.1-3 shows that all the analyzed road segments function at acceptable levels of service in both the peak hours and peak generator hours.

Table 14.1-1 1992 Existing Signalized Intersection Level of Service

Westborough	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Route 9 and Otis	C	C	C	C
Eastbound	C	B	C	B
Westbound	B	C	B	B
Northbound	D	D	D	D
Southbound	E	D	D	D

Table 14.1-2 1992 Existing Unsignalized Intersection Level of Service

Westborough	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT and RT from Gleason	A	A	A	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	B	C	A	A
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	A	B	A	B
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	A	A	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher		A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-3 1992 Existing Road Segment Level of Service

Westborough	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Otis North of Smith Valve	C	C	C	C
Smith Valve West of Otis	B	B	B	B
Smith Valve West of Site	B	B	B	B

The Westborough Police Department was contacted on June 27, 1994 to determine the existence and location of any safety concerns or high accident history intersections. Chief Parker did not believe that any of intersections or roadways within the study area currently experience a high frequency of accidents. He did express general concern about the effect of increased traffic within the area.

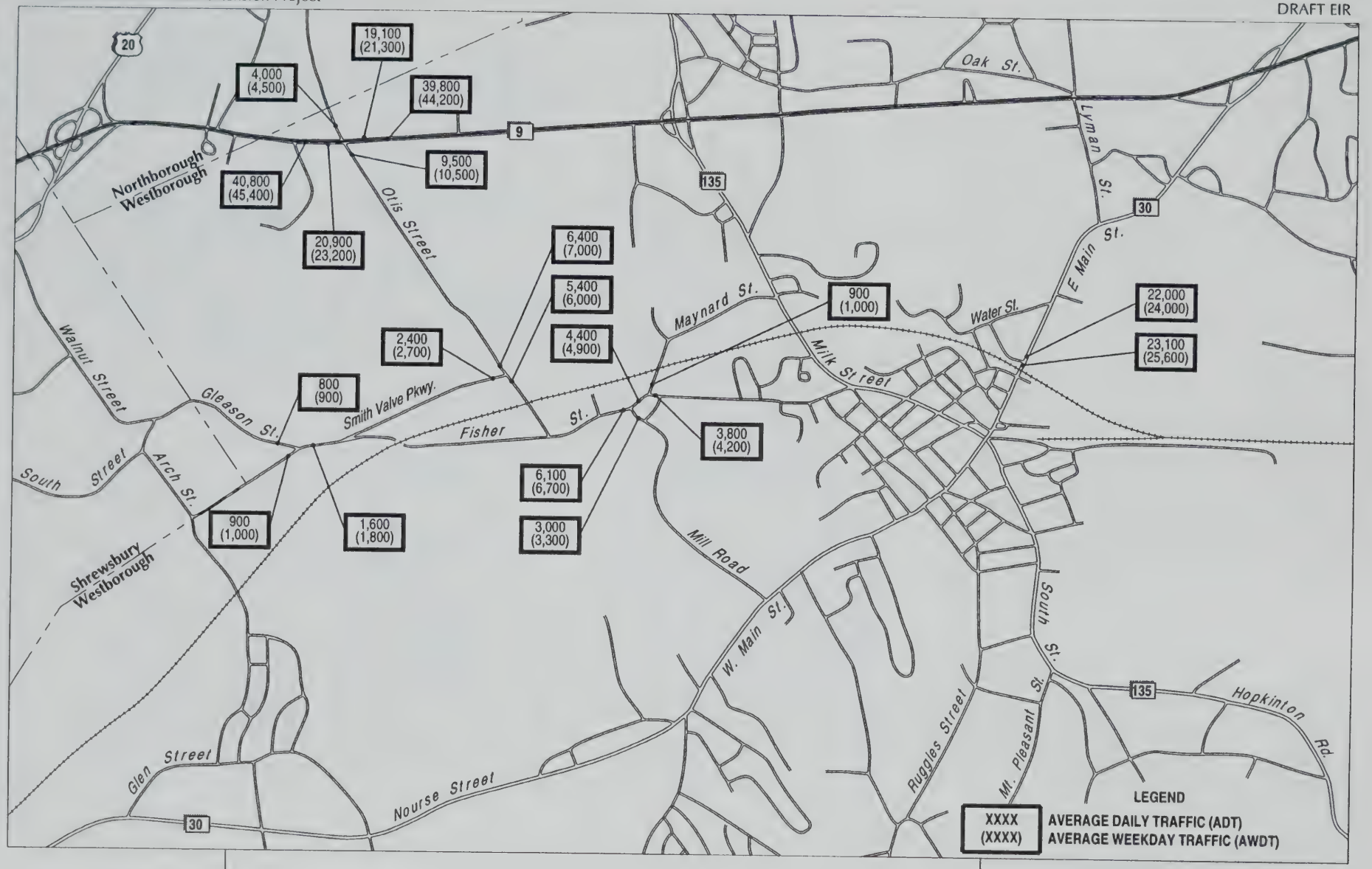
Rail Ridership Projections

Projections of rail ridership at each of the proposed stations of the Worcester Extension Project were prepared by the Central Transportation Planning Staff (CTPS) in May, 1994. The full CTPS ridership projection memo is included in Appendix 2.0. CTPS projected that the Westborough station would attract 216 daily round trip commuters in 1996. Seventeen (17) patrons are expected to be dropped off at that station. The remaining 199 patrons would be Park'n'Ride patrons. Based on a vehicle occupancy rate of 1.12, the 199 Park'n'Ride patrons would result in a demand for 178 parking spaces.

The patrons of the Westborough Station are projected to originate from the towns of Westborough, Northborough, Upton and Shrewsbury. The table below shows the town of origin for the projected Westborough Station riders.

Table 14.1-4 Town of Origin Westborough Station Projected Ridership - Year 1996

Town	Riders
Westborough	22
Northborough	90
Upton	40
Shrewsbury	64
TOTAL	**216**



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Approx. Scale: 1" = 2250'
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1992 Average Daily Traffic & 1992 Average Weekday Traffic
WESTBOROUGH, MA

FIGURE 14.1-3

The impact of the commuter rail riders on area streets as they travel to the Westborough Station is determined by assigning those commuters to a particular route in the study area. Riders who live in Westborough would utilize a variety of travel routes depending on the location of their residence. Riders from Northborough were assigned to Route 9 westbound to Otis Street. Riders from Upton were assigned to a route that includes Route 135, School Street, West Main Street, Mill Road and Fisher Street. Riders from Shrewsbury would use Route 9 eastbound to Otis Street and Route 20 to Walnut Street to Gleason Street. Figure 14.1-4 shows the projected distribution and percentage of station related traffic that would use Westborough area roadways.

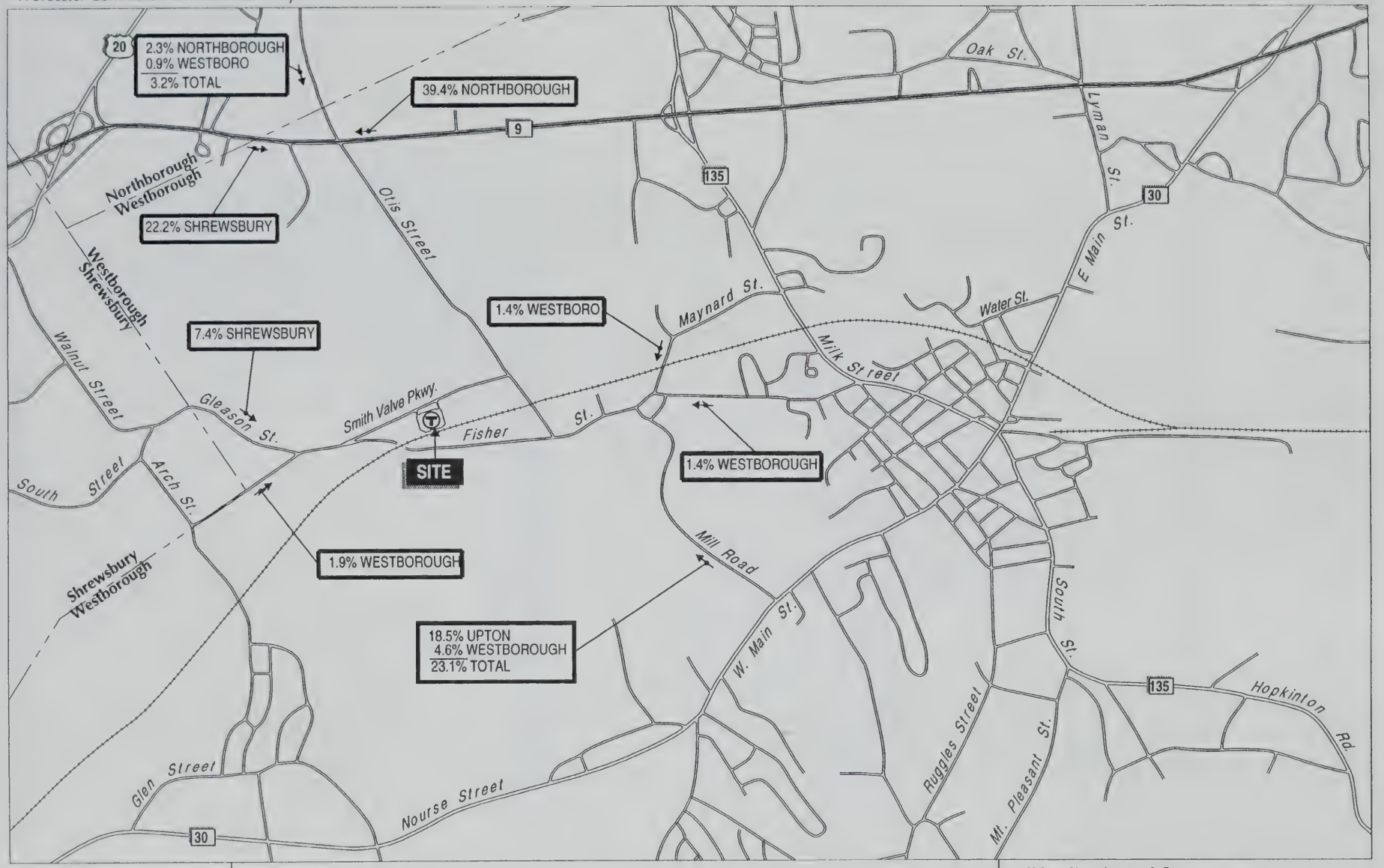
Assignment of Riders to Trains

Commuter rail riders to a Westborough station would arrive at the station to catch one of four A.M. peak period trains and would leave the station based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several MBTA commuter rail lines. The observations of distribution by trains tend to show the greatest number of riders on the trains that arrive at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, observations show the greater ridership in the middle of what is normally considered the peak commuting period.

1996 Traffic Impacts

The 1996 traffic impacts must also consider background growth of traffic in addition to existing traffic volumes and the new riders destined for the station. Background growth is usually determined by tracking historical growth rates of permanent count locations. During the 1980's, traffic grew at rates of 2 - 3% or more a year in many areas. Data from permanent count locations in the Westborough area showed mixed results including decreases in traffic volumes. As a conservative approach, 0.5% annual growth of traffic volumes was assumed from 1992 to 1996.

The traffic impacts of both a "No Build" and "Build" alternative were prepared. The 1996 "No Build" alternative allows a comparison with the 1996 traffic impacts of building the commuter rail station. The "Build" alternative did not assume any redistribution of existing traffic on local roads. In other words, the commuters driving to the rail station were considered to be new trips. In actuality, many of those who would drive to the station are already on the road. Their trip will be shortened by driving to the station. In some cases, they are already driving on the same roads to go to Route 9, for example, as they would to go to the new station. The "Build"



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Approx. Scale: 1" = 2250'

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Distribution of Commuter Rail Station Traffic
1996 BUILD ALL STATIONS
WESTBOROUGH STATION

FIGURE 14.1-4

analysis, therefore, does some double counting of vehicles and tends to be a worst case analysis.

The only anticipated change to the study area roadway network will occur at the signalized intersection of Route 9 and Otis Street. The Massachusetts Highway Department (MHD) is in the design phase of improvements to increase capacity at the intersection. Currently, both Route 9 approaches to the intersection consist of two thru/general purpose lanes with one exclusive left turn lane and one exclusive right turn lane. MHD proposes to extend the exclusive right turn lanes on both approaches and convert them to thru/general purpose lanes. In conjunction with these improvements, the eastbound left turn only lane will be extended to provide additional storage. Therefore, the proposed geometry on Route 9 will consist of three thru/general purpose lanes and an exclusive left turn lane on each approach. The improvements are expected to be in place by 1996. Therefore, both the "No Build" and "Build" analyses were conducted utilizing the proposed geometry.

The peak hour and peak generator overlap by 30 minutes in the A.M. period; there is no overlap in the P.M. peak period. Both the peak hour and peak generator hour were analyzed to determine the greatest impacts to the study area roadways.

Tables 14.1-5 through 14.1-8 present the results of the LOS analysis for the signalized and unsignalized intersections. The tables reflect both the "No Build" and "Build" condition.

Table 14.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours

Westborough	A.M. Peak Hour		A.M Peak Generator Hour	
	No Build	Build	No Build	Build
Route 9 and Otis	C	C	B	B
Eastbound	C	C	B	B
Westbound	B	B	B	B
Northbound	D	D	D	D
Southbound	D	D	D	D

Table 14.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 9 and Otis	C	C	B	C
Eastbound	B	B	B	B
Westbound	B	B	B	B
Northbound	D	D	D	D
Southbound	D	D	D	D

Table 14.1-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT from RT from Gleason	A	A	A	A
Smith Valve and Site's W-DW				
LT from WB Smith Valve	-	A	-	A
Smith Valve and Site's E-DW				
LT from Lot	-	A	-	A
RT from Lot	-	A	-	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	B	B	A	B
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	A	B	A	A
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	A	B	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher	A	A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours

Westborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT from RT from Gleason	A	A	A	A
Smith Valve and Site's W-DW				
LT from WB Smith Valve	-	A	-	A
Smith Valve and Site's E-DW				
LT from Lot	-	A	-	A
RT from Lot	-	A	-	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	C	C	A	B
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	B	B	B	B
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	B	B	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher	A	A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-9 1996 Road Segment Level of Service - A.M. Peak Hours

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Otis North of Smith Valve	C	C	C	C
Smith Valve West of Otis	B	B	B	B
Smith Valve West of Site	B	B	B	B

Table 14.1-10 1996 Road Segment Level of Service - P.M. Peak Hours

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Otis North of Smith Valve	C	C	C	C
Smith Valve West of Otis	B	B	B	B
Smith Valve West of Site	B	B	B	B

As the tables indicate, both the signalized and unsignalized intersections will operate at acceptable levels of service under the "No Build" and the "Build" conditions. The traffic turning from Smith Valve Parkway to Otis Street will have some minor reduction in LOS in the "Build" condition, as will traffic turning from Mill Road to Fisher Street.

Three roadway segments were analyzed for LOS in the "No Build" and "Build" conditions. The results of the analysis are shown in Tables 14.1-9 and 14.1-10. As shown, the segments function acceptably in both the "No Build" and the "Build" conditions.

1996 Traffic Impacts - Westborough Station Only

In order to address an upper limit, worst case situation with regard to traffic impacts on Westborough streets, an analysis was performed which considered that the Westborough commuter station was the only commuter station built by 1996 (in addition to a Worcester Station).

CTPS projected that under this scenario, the Westborough station would attract a total of 506 daily round trip commuters to Boston, 465 of which would be Park'n'Ride

patrons. Site traffic was distributed over the roadway network in a manner similar to that used for the 1996 "Build All Stations" scenario. The projected distribution is shown in Figure 14.1-5.

A LOS analysis was performed for the peak hour and peak generator hour "Build" condition. The "No Build" condition is the same as previously presented for the "Build All Stations" scenario. Again, the Route 9/Otis Street intersection was analyzed using the geometry proposed in the MHD intersection improvement project.

Tables 14.1-11 through 14.1-16 list the results of the analysis for the signalized and unsignalized intersections.

Table 14.1-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Westborough Station Only)

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 9 and Otis	C	C	B	B
Eastbound	C	C	B	B
Westbound	B	B	B	B
Northbound	D	D	D	D
Southbound	D	D	D	D

Table 14.1-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Westborough Station Only)

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 9 and Otis	C	C	B	C
Eastbound	B	B	B	B
Westbound	B	B	B	B
Northbound	D	D	D	D
Southbound	D	D	D	D

Table 14.1-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Westborough Station Only)

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT from RT from Gleason	A	A	A	A
Smith Valve and Site's W-DW				
LT from WB Smith Valve	-	A	-	A
Smith Valve and Site's E-DW				
LT from Lot	-	A	-	A
RT from Lot	-	A	-	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	B	C	A	C
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	A	C	A	B
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	A	A	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher	A	A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Westborough Station Only)

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT from RT from Gleason	A	A	A	A
Smith Valve and Site's W-DW				
LT from WB Smith Valve	-	A	-	A
Smith Valve and Site's E-DW				
LT from Lot	-	A	-	A
RT from Lot	-	A	-	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	C	C	A	C
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	B	B	B	B
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	A	A	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher	A	A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-15 1996 Road Segment Level of Service - A.M. Peak Hours (Westborough Station Only)

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Otis North of Smith Valve	C	C	C	C
Smith Valve West of Otis	B	C	B	C
Smith Valve West of Site	B	B	B	B

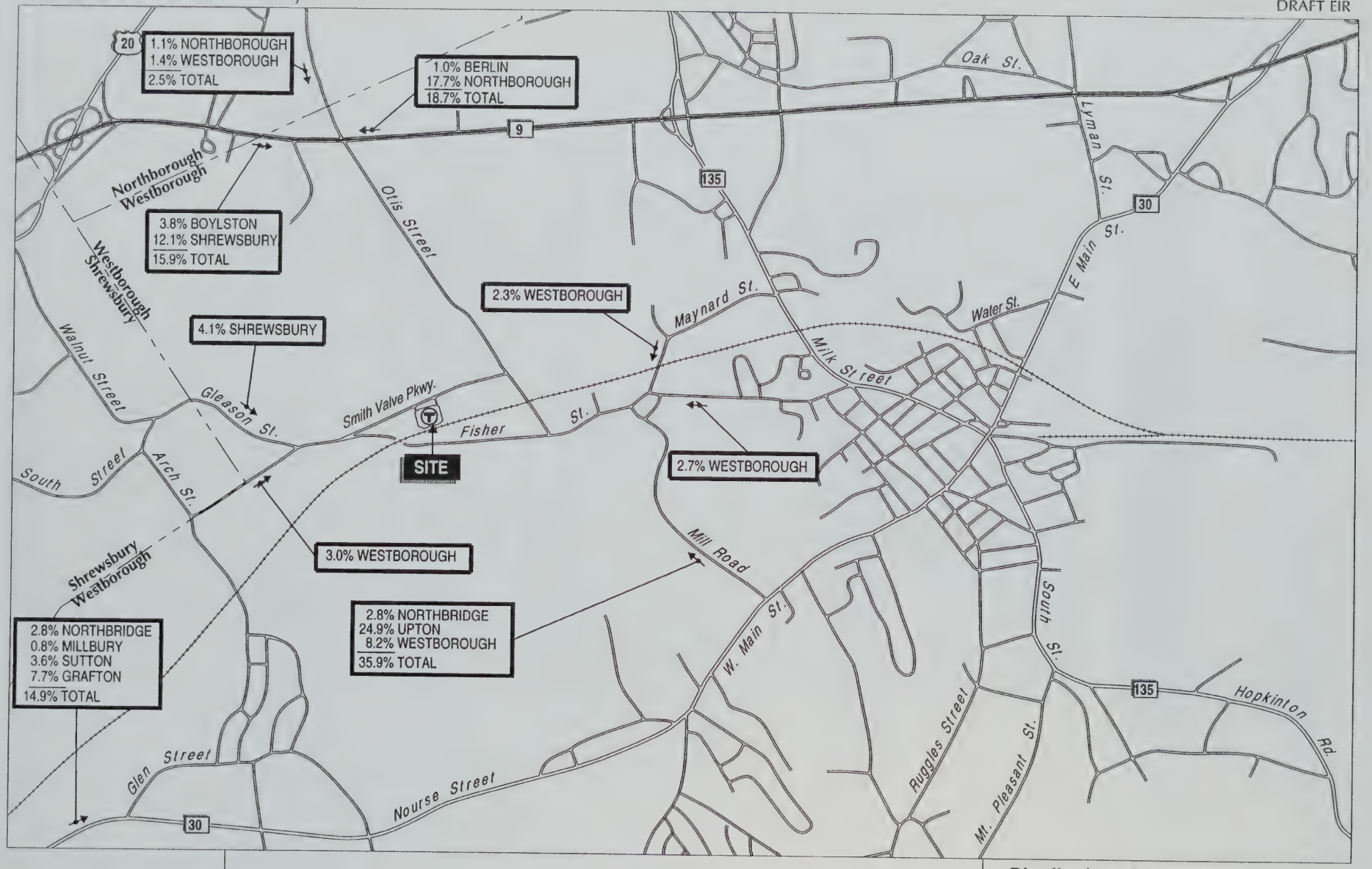
Table 14.1-16 1996 Road Segment Level of Service - P.M. Peak Hours (Westborough Station Only)

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Otis North of Smith Valve	C	C	C	C
Smith Valve West of Otis	B	B	B	C
Smith Valve West of Site	B	B	B	B

The signalized intersection at Route 9 and Otis Street, while operating acceptably under both the "No Build" and "Build" conditions, will experience a minor reduction in LOS in the P.M. peak generator hour.

Tables 14.1-13 and 14.1-14 show that under both the "No Build" and "Build" conditions all unsignalized intersection movements will operate at LOS C or better. Traffic turning from Smith Valve Parkway to Otis Street and traffic turning from Mill Road to Fisher Street will have some minor reduction in LOS during certain peak periods.

The road segments shown in Tables 14.1-15 and 14.1-16 all operate at acceptable levels of service under the "No Build" and "Build" conditions. Smith Valve Parkway west of Otis Street will have minor reductions in LOS during certain peak periods.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2250'
0 2250

Distribution of Commuter Rail Station Traffic
1996 BUILD Westborough Only
WESTBOROUGH STATION
FIGURE 14.1-5

2001 Traffic Impacts

A LOS analysis was prepared for the Westborough study area intersections and road segments using year 2001 traffic volumes and ridership projections. Background traffic growth of 1.5% per year was assumed for the period 1996 to 2001. The proposed Fountainhead Plaza project, in the northwest quadrant of the Route 9/Otis Street intersection, was not factored into the background traffic. Refer to Traffic Appendix Section 1.6 for an analysis of the effects of this project on the Route 9/Otis Street intersection.

CTPS projected a total of 230 daily round trip commuters at the Westborough Station in the year 2001. Eighteen are expected to be dropped off at the station. The remaining 212 riders would be Park'n'Ride patrons. Distribution of traffic is essentially the same as shown in Figure 14.1-4.

Again, as in the 1996 analyses, the signalized intersection at Route 9 and Otis Street was analyzed using the geometry proposed in the MHD intersection improvement project.

Tables 14.1-17 through 14.1-20 show the calculated levels of service at the signalized and unsignalized intersections for the "No Build" and "Build" conditions.

A review of the tables indicates that the signalized intersection of Route 9 and Otis Street will operate acceptably in both the "No Build" and "Build" conditions. A minor reduction in LOS is noted in the A.M. peak generator hour "Build" condition.

Likewise, the unsignalized intersections are shown to function acceptably in the "No Build" and "Build" conditions. Traffic turning from Smith Valve Parkway to Otis Street will again experience some reduction in level of service, but will still operate acceptably.

The results of the road segment analysis are shown in Tables 14.1-21 and 14.1-22. As indicated, the road segments will operate at acceptable levels for both "No Build" and "Build" conditions. Smith Valve Parkway west of Otis Street experiences a minor reduction in level of service in the A.M. peak generator hour.

Table 14.1-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 9 and Otis Street	C	C	B	C
Eastbound	C	C	B	B
Westbound	B	B	B	B
Northbound	D	D	D	D
Southbound	D	D	D	D

Table 14.1-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Route 9 and Otis Street	C	C	C	C
Eastbound	B	B	B	B
Westbound	B	B	B	B
Northbound	D	D	D	D
Southbound	D	D	D	D

Table 14.1-19 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT and RT from Gleason	A	A	A	A
Smith Valve and Site's W-DW				
LT from WB Smith Valve	-	A	-	A
Smith Valve and Site's E-DW				
LT from Lot	-	A	-	A
RT from Lot	-	A	-	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	B	C	B	B
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	B	B	B	B
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	A	A	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher	A	A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Fisher and Gleason				
LT from EB Fisher	A	A	A	A
LT and RT from Gleason	A	A	A	A
Smith Valve and Site's W-DW				
LT from WB Smith Valve	-	A	-	A
Smith Valve and Site's E-DW				
LT from Lot	-	A	-	D
RT from Lot	-	A	-	A
Otis and Smith Valve				
LT from NB Otis	A	A	A	A
LT and RT from Smith Valve	C	D	B	C
Fisher and Mill				
LT from WB Fisher	A	A	A	A
LT and RT from Mill	C	C	B	B
Fisher and Maynard				
LT from EB Fisher	A	A	A	A
LT and RT from Maynard	A	A	A	A
Arch and Fisher				
LT from SB Arch	A	A	A	A
LT and RT from Fisher	A	A	A	A
Glen and Arch				
LT from EB Glen	A	A	A	A
LT and RT from Arch	A	A	A	A

Table 14.1-21 2001 Road Segment Level of Service - A.M. Peak Hours

Westborough	A.M Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Otis North of Smith Valve	C	C	C	C
Smith Valve West of Otis	B	B	B	C
Smith Valve West of Site	B	B	B	B

Table 14.1-22 2001 Road Segment Level of Service - P.M. Peak Hours

Westborough	P.M Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Otis North of Smith Valve	D	D	C	C
Smith Valve West of Otis	B	B	B	B
Smith Valve West of Site	B	B	B	B

Summary of Findings

The streets and intersections within the Westborough study area operate at acceptable levels of service under the "No Build" and "Build" conditions for both year 1996 and year 2001 scenarios. Some reduction in level of service is expected for Smith Valve Parkway traffic turning onto Otis Street and Mill Road traffic turning onto Fisher Street. However, the intersections will function acceptably during all peak periods.

The signalized intersection of Route 9 and Otis Street shows signs of declining operating LOS on some approaches in the existing condition. It is expected that this would continue with or without the proposed rail station due to normal background traffic growth. To alleviate this situation, the Massachusetts Highway Department has proposed improvements to increase capacity on Route 9. With the proposed improvements, which are expected to be in place by 1996, the intersection will function at acceptable levels of service in both the "No Build" and "Build" conditions.

In summary, the analysis indicates that the construction of the proposed commuter rail station will not have an adverse impact on traffic operations within the Westborough study area.

14.2 Air Quality

Employing the rationale and methodology described for the Millbury Route 122 Station analysis, the intersection of Route 9 and Otis Street was selected for the analysis (see Figure 14.1-1). Intersection improvements scheduled by the Massachusetts Highway Department will allow the intersection to function at LOS C.

In order to simulate the highest CO concentrations, receptor locations were established along the sidewalk areas nearest to the traffic lanes. The offsets are 24 feet from the center of Otis Street and 48 feet from the center of Route 9. The results for the year 1996 are as follows in Table 14.2-1.

Table 14.2-1 1996 CO Concentrations - Route 9/Otis Street Intersection

	1-Hour CO (ppm)		8-Hour CO (ppm)	
	No Build	Build	No Build	Build
Southwest Sidewalk	9.3	9.3	6.5	6.5
Northwest Sidewalk	8.5	8.5	5.9	5.9
Northeast Sidewalk	8.3	8.4	5.8	5.9
Southeast Sidewalk	9.9	9.9	6.9	6.9

The predicted CO concentrations are the same for the "No Build" and "Build" conditions for both the 1-hour and 8-hour periods, with the exception of an increase of 0.1 ppm at the northeast sidewalk for both periods. All volumes are well below the 35 ppm for the 1-hour standard and 9 ppm for the 8-hour standard. Additional receptors evaluated included the shopping plaza on the southwest, the vacant lot on the northwest, the apartment building (and parking area) on the northeast, and the car dealership building and display lot on the southeast. The predicted CO concentrations for the 1-hour case range from 4.3 ppm for the "No Build" to 7.8 ppm for the "Build" condition. Similarly the 8-hour values range from 3.0 ppm to 5.5 ppm. Most predicted concentrations are the same or only slightly higher for "Build" versus "No Build".

14.3 Noise and Vibration

Noise Impact Analysis Methodology

Because of slow train speeds near stations, the potential for noise and vibration impacts from train operations are at a minimum compared to other segments of the right-of-way. There is, however, the potential of effects on the noise and vibration environment in the vicinity of the station because of project-induced traffic on roads leading to and from station areas, as well as short-term effects during construction of platforms, parking and other site facilities.

Traffic Noise

The significance of noise impacts from project-generated traffic near proposed commuter rail stations along the corridor was assessed based on the projected noise increase relative to the noise from existing traffic on applicable roads. Because the greatest changes in traffic volumes are expected to occur during peak commuting periods, the noise increase was evaluated in terms of the peak-hour L_{eq}.

Criteria for traffic noise impact are based on existing FTA guidelines, and state that a noise level increase of greater than 5 dBA is considered to represent impact. The existing FTA criteria are used here rather than the proposed FTA criteria used in the train noise assessment because of the general, non-site specific nature of the traffic noise impact assessment. Where the existing layout of major roads will essentially remain the same, the traffic noise assessment predicts only the change in noise resulting from the projected change in traffic volumes near the stations, and not the absolute traffic noise levels at specific noise-sensitive locations in the community.

The traffic noise analysis was carried out on a relative basis, by estimating the change in peak-hour traffic noise, which is a function of the change in peak-hour traffic volume. The assumption is that all other non-project related noise sources remain unchanged.

Construction Noise and Vibration

The construction of a fixed facility such as a commuter rail station is expected to include clearing, excavation, foundation work, equipment installation, paving and finishing. Construction machinery is likely to include the types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes and trucks. Construction will typically occur during 8 to 10 hour weekday, daytime periods.

Construction of the station can be categorized in two distinct operations—parking lots and platform areas—with total duration of construction estimated to be approximately eight months.

For a typical station site, the distance to significant noise impact was estimated to be 200 feet measured from the closest area of construction. In cases where noise-sensitive land uses were concentrated in a location very close to either the platform area or the parking area, separate screening distances were used to assess the two construction scenarios.

Station construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Usage factors were assigned to each piece of equipment to determine a cumulative reference noise level to use in determining the width of the noise impact zone.

Noise impact criteria for construction are based on the outdoor Annual Average Day-Night Equivalent Sound Level (AA L_{dn}), with a threshold of 65 AA L_{dn} defining the impact zone. This metric is slightly less conservative than the 24-hour L_{dn} used for train noise impact, given the short-term nature of construction noise impact. (A complete definition of metrics and terms pertaining to noise and vibration used in this report are given in Appendix, Volume II, Section 3.0).

The impact criteria for construction vibration are essentially the same as for train operations, except that impact is assessed only when the activity will occur for 30 days or more at a given location. Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990) . Vibration projections were made for the main equipment categories, based on the relative amount of energy imparted to the ground. Details on this methodology are given in Appendix 3.0. A screening distance of 85 ft measured from nearest area of construction was estimated for vibration impact from general construction activity at stations.

Traffic Noise Impacts

No additional roads are proposed to be built to access the Westborough station site; therefore, relative increase in traffic noise is sufficient for evaluating noise impact. During the morning peak hour, traffic volumes on Smith Valve Parkway between the station driveway and Otis Street will be increased 40% over existing volumes. This increased traffic volume would result in approximately a 1.5 dB increase in peak hour L_{eq}, which is below the defined threshold of impact for relative noise increase. All other roads used by station patrons would experience lesser changes in relative noise levels for peak hour traffic conditions.

Construction Noise and Vibration Impacts

There are several residences on Fisher Street south of the station site in Westborough. All but three of these properties are located beyond the screening distance for construction noise impact, and there are no residences within the screening distance for vibration impact.

Traffic Noise Mitigation

No significant traffic noise impact was identified for the Westborough station.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures can be implemented:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers, and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

During the project design phase, specific construction noise limits should be developed and incorporated into the contract specifications, along with requirements for noise monitoring to certify compliance with the specified limits.

No significant construction vibration impact was identified for the Westborough station site.

14.4 Site Drainage

The Westborough Station site lies within the Assabet River watershed. The proposed station parking lot will be constructed in the upland areas of the site in an effort to avoid direct impact on the adjacent wetlands. The upland (westerly and southerly) areas of the site consist of grassed areas with scattered trees and shrubs. Subsurface

soil conditions consist of sands and sandy loam and are classified as "somewhat excessively drained" according to standard soil classification.

Stormwater currently drains from the site in a northerly and easterly direction, either through drainage swales within the wetlands located near the east flank, or directly onto Smith Valve Parkway then, it enters a stormdrain collection system within Smith Valve Parkway, is carried in a northerly direction through a series of drain pipes, and ultimately discharges into Hocomonco Pond.

The proposed Westborough Rail Station will consist of 300 paved parking spaces, sidewalks, ramps, stairs, train platforms, landscaping and associated storm drain systems (see Figure 14.0-1). The project will implement Best Management Practices (BMPs) to mitigate any stormwater impacts created by the development. The BMP will include a parking lot sweeping program and a scheduled maintenance program to remove sediment loads from catch basin sumps and the detention basin. All catch basins will be equipped with sumps and oil and grease traps.

The proposed stormdrain system will mitigate increases in peak stormwater flow rates by construction of an on-site stormwater detention basin. The detention basin will be graded with sideslopes no steeper than three horizontal to one vertical (3 to 1), and the bottom will be vegetated and normally dry. The basin will be sized to accommodate flows from all storms up to and including the 100 year event. An outlet control structure will be designed to release the detained stormwater at a peak flow rate which will not exceed existing conditions for both the 10 and 100 year storm events. The results of this hydrological analysis are presented in Table 14.4-1. The outflow from the basin will be tied directly into the Smith Valve Parkway closed drainage system. Since peak flow rates have been reduced to or below pre-construction levels, no adverse impact on the existing system will result. The watershed mapping, TR-55 analysis and computer generated hydrograph results are included in Appendix Volume II, Section 5.

Table 14.4-1 Peak Runoff Rates Westborough Station

Storm Event	Existing Conditions	Proposed Conditions
10 Year	0.5 cfs	0.5 cfs
100 Year	2.9 cfs	1.6 cfs

Water Supply

Public groundwater supply wells in the study area include the two Otis Street wells (existing and potential) north of Hocomonco pond and the Wilkinson and Andrews

wells to the south of the SUASCO Reservoir. The direct recharge area for the Otis Street wells is north of Hocomonco Pond and the station site. The direct recharge area for the three wells south of the station site includes a portion of the railbed west of the station but not the station site itself. The station site does, however, lie within a Zone B contributing watershed area. The wells and recharge areas are shown on Figure 14.4-1. It is not expected that the station site will change either the quantity or quality of recharged groundwater in any adverse way.

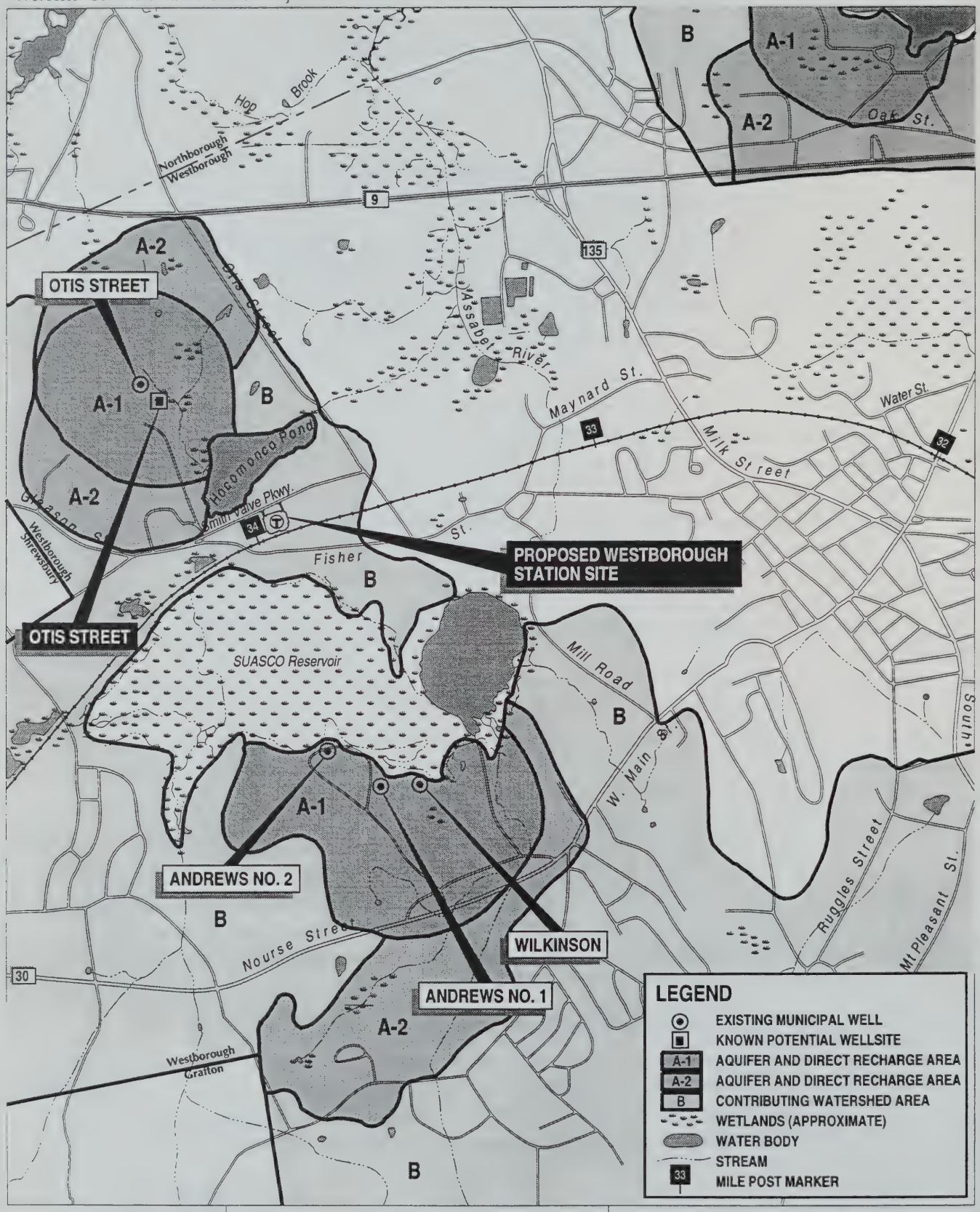
14.5 Wetlands and Wildlife

Wetland resources in the vicinity of the Westborough station site include the SUASCO reservoir to the south and Hocomonco Pond to the north. The SUASCO is an acronym for the SUdbury, ASsabet and COncord, the three key rivers in the watershed. The reservoir is discussed in the context of the rail right-of-way in Section 7.0. Hocomonco Pond, a federal superfund site, is discussed in Section 14.10.

The SUASCO Reservoir was created in the mid 1970's, at the headwaters of the Assabet River. This site is identified as the A1 site in the Corps of Engineers list of dams since it is the first dam site on the Assabet River. The Sudbury River joins with the Assabet River in Concord to form the Concord River. The Reservoir is a largemouth bass fishery and also is stocked with Northern Pike and Tiger Muskie.

A Great Blue Heron rookery, within the SUASCO impoundment, is approximately one quarter mile from the track. The colony has been declining in recent years because the trees that were flooded when the area was impounded are gradually falling, thus reducing the number of nesting sites. The state ornithologist has been studying the colony for years and is of the opinion that current train operations have no adverse impact on the birds and that any increase in activity on the rail line will not affect the colony.

The Westborough station site itself includes a cleared upland area and a wooded wetland area on the easterly portion of the site as shown on the site plan presented in Figure 14.0-1. The boundary for this wetland has been flagged and field surveyed. The wetland area contains drainage swales which carry surface runoff to a storm



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'

0 2000

AQUIFER AND WATERSHED PROTECTION DISTRICTS TOWN OF WESTBOROUGH, MA

FIGURE 14.4-1

drain system under Smith Valve Parkway and eventually to Hocomonco Pond. A small isolated wetland area south of the railroad directs surface runoff to a stone culvert under the railroad embankment to the larger wetland area.

The site does not lie within any flood plain area as identified in the Flood Insurance Rate Map (FIRM) for the Town of Westborough, community-panel number 250344 0003 B, dated May 15, 1980.

The station parking lot has been reconfigured since the distribution of the Environmental Notification Form (ENF) in order to minimize wetland impacts to the fullest extent possible. The commuter rail station design has incorporated accessibility elements, clearance requirements for rail operations and the ridership demand as well as wetland and water quality issues. The parking lot footprint will be within the buffer zone of the wetland resources to the east but no wetland filling is proposed. BMPs proposed for this site are discussed in Section 14.4 Site Drainage. All final design elements will be coordinated with the Westborough Conservation Commission.

14.6 Historic Properties/Sites

There are no architectural resources located near the proposed Westborough Station.

14.7 Archaeological Resources

As part of the EIR process, the MBTA has undertaken a reconnaissance archaeological and cultural resources survey for the Westborough site. An archaeologist was also present at the Westborough site during the excavations that were necessary as part of the hazardous materials (Chapter 21E) investigation. The proposed Westborough station would occupy broadly level terrain within about 200 m. of Hocomonco Pond and other bodies of water. These characteristics imply a moderate probability that the proposed station area contains prehistoric or Contact-period sites. However, construction of a railroad siding has impacted the proposed station area, and prehistoric sites are not likely to have survived the associated grading. As a component of preparation of the FEIR an archaeological survey will be conducted to determine if potentially significant archaeological resources are present on the site.

14.8 Visual Impacts

The station, including a pedestrian overpass and associated stairs and ramps, will be compatible with the industrial area within which the facility will be located. The parking lot will be appropriately landscaped. The design will be compatible with Westborough's requirements in its General Industrial zone.

Lighting will be designed to consider both on and off-site conditions. Special consideration will be given to minimize the impact on houses located to the south of the station on Fisher Street. High pressure sodium lights on poles 30 feet in height will be used in the parking lot. The light fixtures or luminaires will be the cut-off design which directs the light at the ground with minimum spillover to adjoining properties. The light source from a cut-off luminaire is not visible except when standing directly under the light. The lights will be on from dusk to approximately one-half hour after the last train. Photoelectric cells will turn on the lights and a time clock will turn them off. There will be some increase in the ambient light during the period when the lights are on, but they are not expected to be a visual disturbance to abutting houses on Fisher Street.

The dominant vertical feature of the station will be the pedestrian overpass located at an elevation of 21 feet above the tracks. With the addition of a canopy over the walkways, the overpass will have a total height of about 30 feet. Covered stairways and covered access ramps from the north and south side station platforms are additional elements of the overpass. It is anticipated that the top 10 feet of the overpass may be visible from the houses located on Fisher Street. Due to the distance between the overpass and the houses and the limited area which will be visible, there should not be a significant visual impact to the Fisher Street residential area.

An additional vertical element on the in-bound or southside of the tracks will be a covered canopy about 150 feet in length and 15 feet high to protect waiting commuters. The station platform canopy is generally considered a pleasing design element of a station. Because it will be only fifteen feet in height, it will not be visible from the abutting residential area.

14.9 Hazardous Materials

An environmental site evaluation was performed for the proposed Westborough Station site. The purpose of the evaluation was to determine whether hazardous materials or oil may be contained within the soils or groundwater at the site, within the meaning of Massachusetts General Law, Chapter 21E (M.G.L. c.21E).

The purpose of M.G.L. c.21E and its implementing regulations (310 CMR 40.00 - The Massachusetts Contingency Plan) is to "ensure the protection of health, safety, public welfare, and the environment by establishing requirements and procedures for the discovery, notification, assessment of, and response to, releases and threats of releases of oil or hazardous materials, and by identifying these oils and hazardous materials which are subject to these requirements and proceedings."

The environmental site evaluation consisted of the following elements:

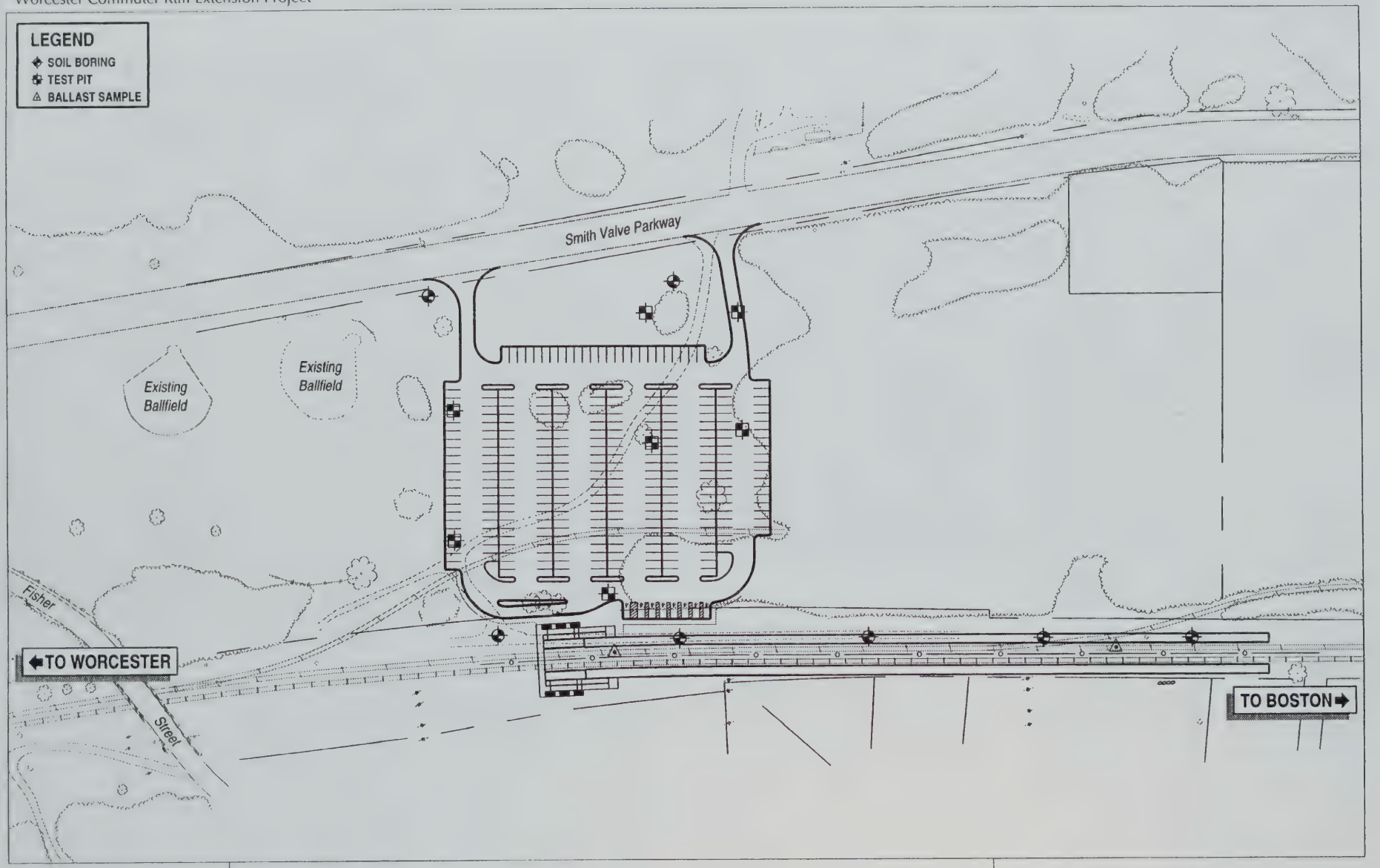
1. A review of the site's history, which concluded that the site has been vacant and undeveloped since the early 1900s. Prior to this the site area was occupied by farmland and pastures. The Smith Valve Corporation has been the site owner since 1976.

2. A review of state and local records which indicated no spills or releases of hazardous materials or oil at the site. Hocomonco Pond, a superfund site located less than one eighth mile north, was used from 1928 until 1946 for wood preservation operations consisting of saturating products with creosote. (See further discussion in Section 14.10).

3. A subsurface exploration program consisting of seven soil borings, seven test pits, and three monitoring wells. Soil samples were taken at each of the borings and test pits. Figure 14.9-1 shows the location of the wells and soil borings. The soil boring and test pit logs are available at the MBTA project office.

4. Soil and groundwater samples were analyzed in a laboratory by chemical screening methods.

The results of the environmental site evaluation indicate no hazardous materials or oil in the soils or groundwater at the site. Furthermore, there is no evidence to indicate contaminants from the Hocomonco Pond Superfund site have impacted observed areas of the site.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 150'
0 150'

SITE PLAN - HAZARDOUS MATERIALS INVESTIGATION (21E) WESTBOROUGH, MA

FIGURE 14.9-1

Of the 8 Resource Conservation and Recovery Act metals, only low levels of cadmium were detected; however, the concentrations were well below reportable levels. Specifically the environmental site evaluation results indicated the following:

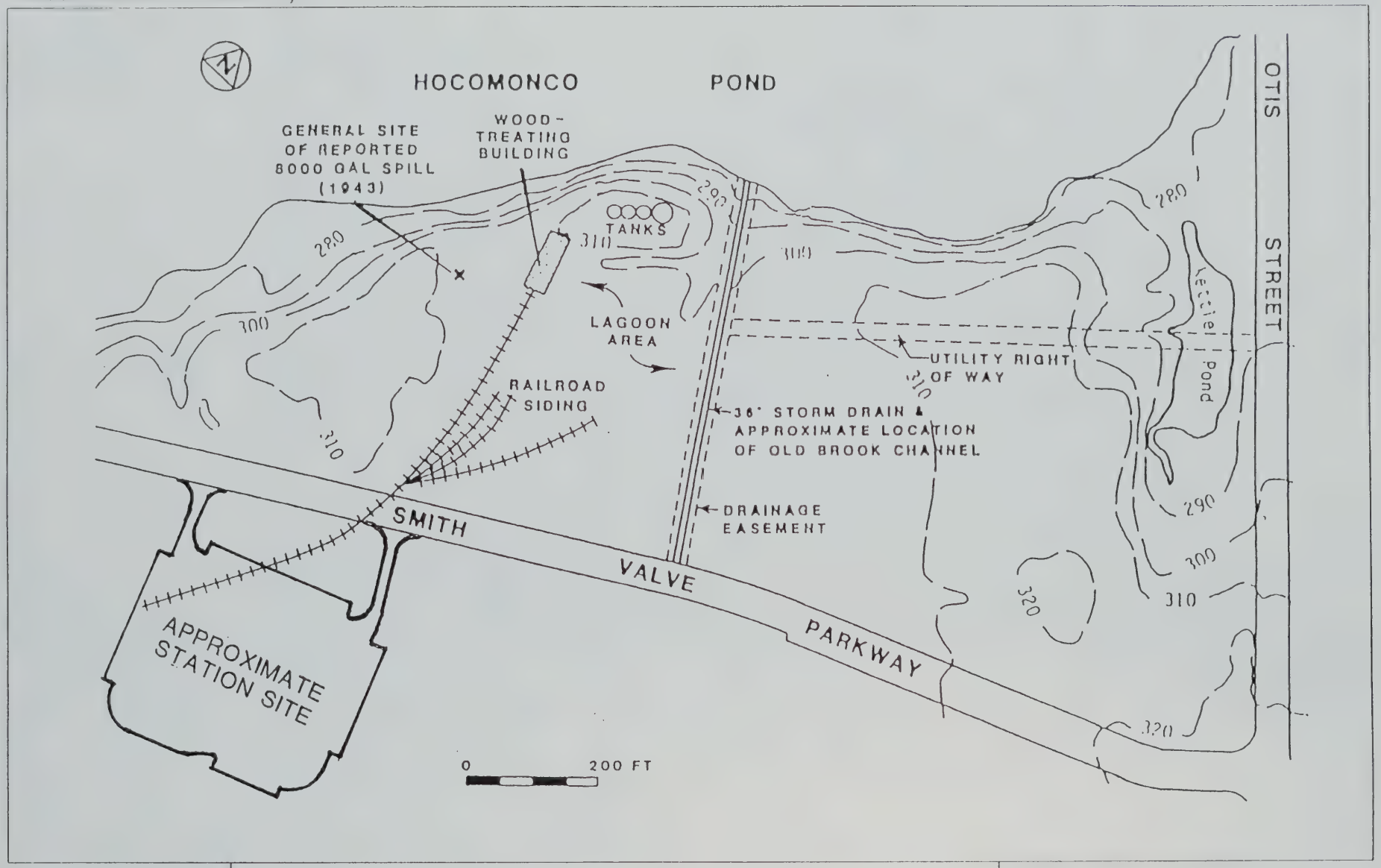
- Results of the total volatile organic compound screening and gas chromatography screening of soil samples did not detect volatile organic compounds, above background levels, in the 49 soil samples analyzed. No pesticides or herbicides were detected above background levels in the composite surface soil sample collected at the site.

- No volatile organic compounds were detected in the groundwater samples collected at the site. Results of the analyses of pH and specific conductance detected typical pH and specific conductance readings for New England groundwater in three of the groundwater samples. One groundwater sample exhibited a pH of 4.0 which is slightly acidic for New England groundwater.

- Neither polychlorinated biphenyls nor petroleum hydrocarbons were detected in the composite ballast sample collected from the railroad bed in the area of the proposed platform at the site.

14.10 Hocomonco Pond Superfund Site

Hocomonco Pond is an EPA Superfund site located north of the proposed Westborough station site on Smith Valve Parkway (Figure 14.10.1). At the turn of the century, Hocomonco Pond was used as a source of block ice but since then has been an industrial site. Between 1928 and 1946 the site was used as a wood treating facility which saturated wood products with creosote. Creosote released from the site has contaminated soil, groundwater and surface water. The cleanup of the site is being coordinated on the state level by DEP's Bureau of Waste Site Cleanup with the U.S. EPA. Studies carried out for the cleanup plan have determined that the extent of the contamination includes the former waste lagoon, Hocomonco Pond, the outlet stream to the Assabet River, and the small kettle pond adjacent to Otis Street.



Massachusetts Bay Transportation Authority

Source: TRC Environmental Consultants, Inc.

HOCOMONCO POND SUPERFUND SITE

FIGURE 14.10-1

The EPA is preparing to begin construction in 1994 of facilities to be used in the remediation. Plans include the construction of an on site landfill for contaminated soil and sediments, capping of the former waste lagoon, installation of a water treatment plant to pump and treat groundwater, bio-remediation, and reconstruction of a portion of the storm drain system that crosses the site. Bio-remediation is a treatment process that uses biological reactions to break down contaminants in soil. According to EPA, construction is expected to be completed by the end of 1995.

The storm drain system reconstruction has been completed. The storm drain system conveys runoff from surrounding upland areas, bypasses the former waste lagoon, and discharges into Hocomonco Pond. The runoff from the commuter rail station site will be retained on site to the extent possible and then connect to this system. Stormwater management for the rail station is discussed in detail in Section 14.4.

14.11 Pedestrian Safety

The CTPS ridership projections do not forecast any patrons walking to the Westborough station. The town has suggested provision of a sidewalk connecting the site to Otis Street, and possibly other sidewalks on nearby streets which would carry station oriented traffic. The MBTA plans to construct sidewalks, the lengths and locations to be determined by consultation with town officials.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge, accessible to the handicapped will be constructed over the tracks to connect station platforms to parking facilities.

14.12 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation,and safety. Station site work will involve clearing, excavation, foundation construction, paving and installing/erection of site facilities such as pedestrian bridges and station canopies. Construction equipment likely to be used includes graders, bulldozers, backhoes, cranes and trucks.

Construction related traffic impacts are not expected to be significant. During certain short-term phases of construction, there will be concentrated deliveries of materials, such as during paving of the parking areas. Station construction will not be particularly labor-intensive, either, and traffic generated by the labor force will not adversely affect level of service on nearby roads.

There will be short-term, intermittent increases in emissions from construction equipment and site-related construction traffic. No violations of air quality standards are anticipated.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of an order-of-conditions issued by the Westborough conservation commission will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise and vibration impacts and possible mitigation are described in the preceding Section 14.3.

Station site construction activities that present a potential safety concern would be secured by temporary fencing or other barriers. The Contractor will be required to adhere to all pertinent regulations regarding use and storage of hazardous or toxic materials on the site.

14.13 Proposed Mitigation and Mitigation Options

The streets and intersections within the Westborough study area were reviewed to identity locations which may require mitigation in accordance with the MBTA Mitigation Policy outlined in Section 3.7.

Traffic generated by the proposed commuter rail station will not cause any location within the Westborough study area to deteriorate from an acceptable level of service to an unacceptable level of service.

The Town on Westborough has expressed concern about increased traffic along the section of Fisher Street adjacent to the existing middle school. Specifically, the concerns involved the safety of school children along this portion of Fisher Street. As part of the construction of the commuter rail station, the MBTA will install guide signs indicating the route to the station. The signing will be installed so as to discourage station bound traffic from using the section of Fisher Street adjacent to the school. Any station generated traffic using this route would likely be local traffic and therefore would not be considered "new" traffic. Thus, no change to the existing conditions for this location is anticipated. But, in deference to the local concerns, the MBTA plans to extend sidewalks beyond the proposed Westborough Station. The MBTA will work with town officials to identify exact lengths and locations.

SECTION 15.0 ENVIRONMENTAL IMPACTS—SOUTHBOROUGH STATION

The proposed commuter rail station in Southborough will be constructed on Southville Road west of River Street (Route 85). In addition to the standard station amenities, parking will be provided for 420 vehicles in two parking lots. North of the tracks, spaces will be provided for 90 cars adjacent to the general store; on the south side of the station, parking will be provided for 330 cars, with a new access drive connecting to Route 85. The site plan is shown on Figure 15.0-1.

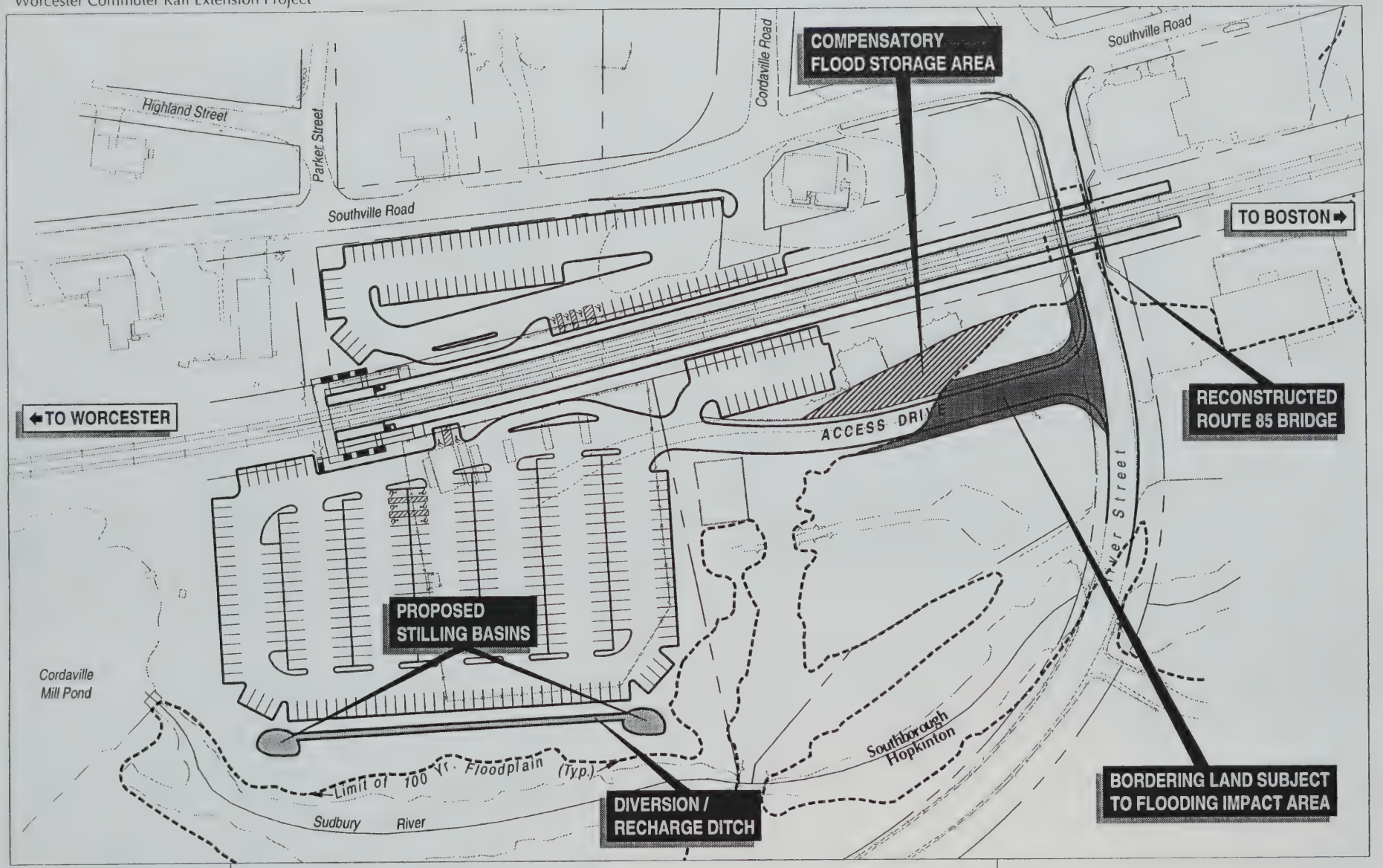
The Southborough Station is projected to attract 550 patrons in 1996, and daily ridership will remain relatively unchanged in 2011 because of the constraints on available parking.

Generally, the streets and intersections in the Southborough study area will function at acceptable levels of service for both the "No Build" and "Build" conditions. However, some locations operate unacceptably during certain peak periods under both conditions.

The River Street/Southville Road intersection operates unacceptably in the "No Build" condition. However, with proper signal timing the intersection will function efficiently with acceptable levels of service.

The Cordaville Road/Main Street intersection, while operating at acceptable levels in 1996, is expected to deteriorate to unacceptable levels during the A.M. peak periods in 2001. It appears this is due to normal traffic growth and will occur with or without the commuter rail station.

Traffic turning from Cordaville Road to River Street and traffic turning from Woodland Road to Cordaville Road experience unacceptable levels of service under both "No Build" and "Build" conditions. The Town of Southborough has expressed a desire to make improvements at these locations in conjunction with the commuter rail project.



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Approx. Scale: 1" = 125'

0 125

SITE PLAN
SOUTHBOROUGH STATION

FIGURE 15.0-1

Three residences on Southville Road will experience noise impact from construction, while two of these residences will be subject to vibration impact. For construction activities south of the railroad, there are no existing residential structures within the screening distances for either construction noise impact or vibration impact.

Stormwater runoff from the parking area north of the tracks will connect into the existing drainline in Southville Road. Stormwater runoff from the south parking lot will flow through a combination of stilling basins and diversion swales before discharging into the Sudbury River, to minimize potential soil erosion and enhance water quality.

The footprint of the proposed station site parking lot would be within the 100 foot buffer zone of the Sudbury River. A portion of the access road to the south lot, and several other parts of the southern portion of the site, would be within an area of bordering land subject to flooding (100 Year floodplain). Compensatory flood storage will be provided by the proposed construction.

15.1 Local Traffic

This section provides a summary of the complete traffic analysis included in Appendix Volume I. This section summarizes existing traffic conditions in Southborough, projected ridership for the Southborough Station and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Southborough Station focused on the streets and intersections identified in the Certificate of the Secretary of Environmental Affairs. Figures 15.1-1 (A.M. Peak Hour) and 15.1-2 (P.M. Peak Hour) show the location for the streets and intersections that were analyzed as part of the study.

Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection. A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours as well as the A.M. and P.M. peak generator hours. The A.M. and P.M. peak hours are those periods when traffic conditions are heaviest. The A.M. and P.M. peak generator hours are those periods when usage of the rail station is heaviest. Traffic count data showed that the A.M. and P.M. peak hours in Southborough are from 7:30 to 8:30 A.M. and 4:45 to 5:45 P.M., respectively. The A.M. and P.M. peak generator hours are from 7:00 to 8:00 A.M. and 5:30 to 6:30 P.M., respectively.

Existing Conditions

Existing conditions were determined by traffic counts and intersection turning movement counts conducted from the Fall of 1992 to the Spring of 1994. The counts were used to calculate existing condition levels of service for each of the intersections and street segments studied. Figures 15.1-1 and 15.1-2 show existing A.M. and P.M. peak hour volumes within the study area. Figure 15.1-3 shows the Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

Tables 15.1-1 and 15.1-2 show the signalized and unsignalized intersection levels of service and Table 15.1-3 shows the roadway segment levels of service.

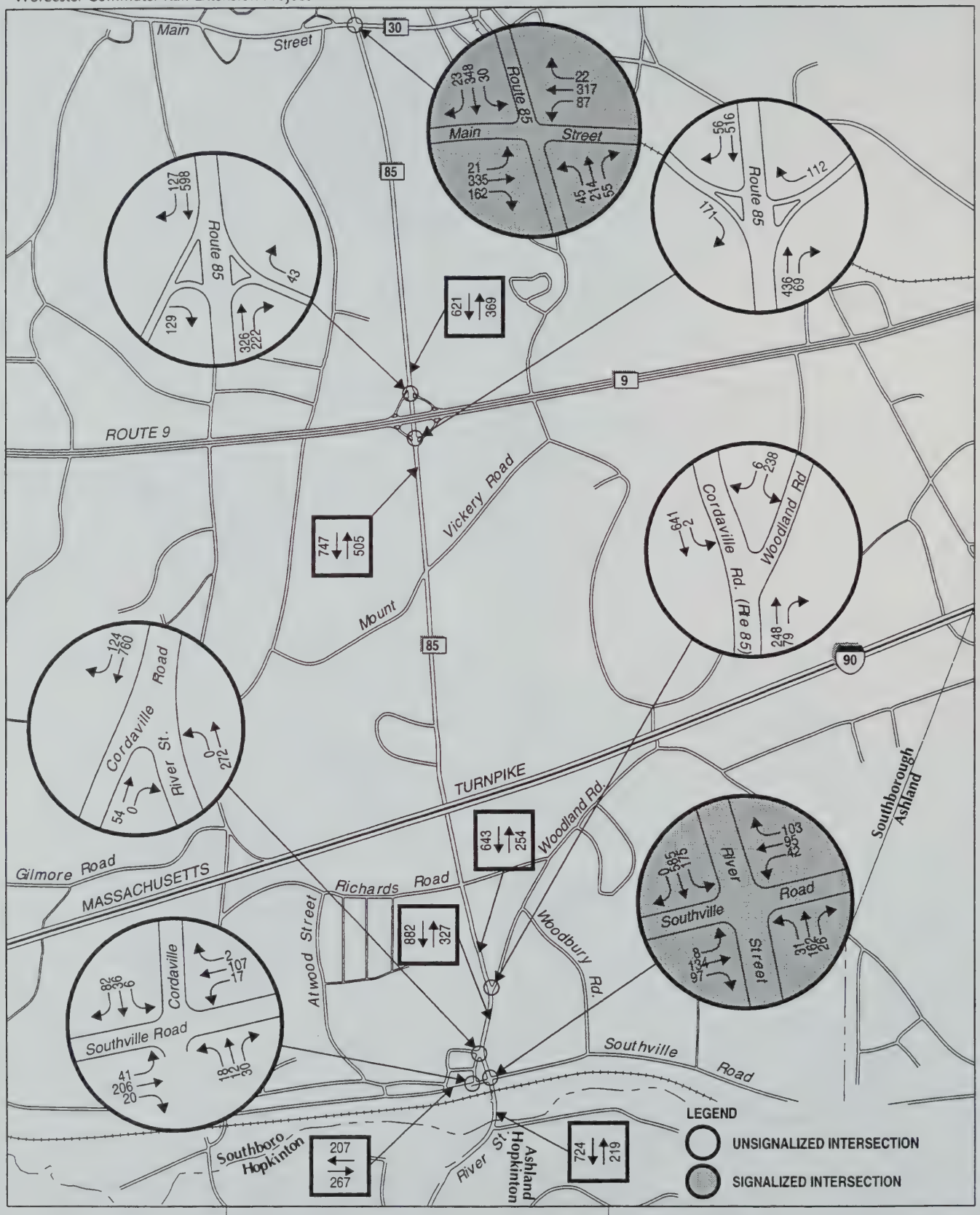
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750

0 1750

A.M. Peak Hour
7:30 - 8:30 A.M.
1992 Existing Conditions
SOUTHBOROUGH STATION

FIGURE 15.1-1



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Approx. Scale: 1" = 1750

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P.M. Peak Hour
4:45 - 5:45 P.M.
1992 Existing Conditions
SOUTHBOROUGH STATION

FIGURE 15.1-2

Table 15.1-1 1992 Existing Signalized Intersection Level of Service

Southborough	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
River and Southville	F	E	F	D
Eastbound	B	B	B	B
Westbound	B	B	B	B
Northbound	F	C	F	B
Southbound	F	F	F	E
Cordaville and Main	D	C	D	B
Eastbound	B	C	B	B
Westbound	C	D	C	C
Northbound	F	B	E	B
Southbound	B	B	B	B

Table 15.1-2 1992 Existing Unsignalized Intersection Level of Service

Southborough	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Store	A	A	A	A
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	A	A	A	A
LT and RT from Cordaville	E	E	E	D
Cordaville and Woodland				
LT from SB Cordaville	A	A	A	A
LT and RT from Woodland	E	F	E	E
NB Cordaville and EB Ramps				
RT from EB Route 9 Ramp	B	A	B	A
SB Cordaville and EB Ramps				
RT from EB Route 9 Ramps	A	B	A	A
NB Cordaville and WB Ramps				
RT from WB Route 9 Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from WB Route 9 Ramp	A	A	A	A

Table 15.1-3 1992 Existing Road Segment Level of Service

Southborough	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
River South of Site	D	E	D	D
Southville West of Site	C	C	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	D	D
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	D	D

As shown in Table 15.1-1, the River Street/Southville Road intersection operates at unacceptable LOS F in both the A.M. peak hour and the A.M. peak generator hour. Additionally, the northbound and southbound approaches also operate at LOS F in the A.M. peak hours. The Cordaville Road/Main Street intersection operates at acceptable levels of service in both the peak hours and the peak generator hours with only the northbound approach at LOS F in the A.M. peak hour.

Table 15.1-2 indicates that the unsignalized intersections generally function at acceptable levels of service. Only the turning movement from Woodland Road to Cordaville Road in the P.M. peak hour is at an unacceptable level of service.

Table 15.1-3 shows that all the analyzed road segments are operating at acceptable levels of service.

Safety Concerns and Accident History

The Southborough Police Department was contacted on June 22, 1994 to ascertain the existence and location of any high frequency accident locations or safety concerns. Chief Colleary indicated that there were no high frequency accident locations within the study area. However, he did express concerns regarding safety and traffic flow at several locations. These concerns are discussed in Section 15.12 of this DEIR.

Rail Ridership Projections

Projections of rail ridership at each of the proposed stations of the Worcester Extension Project were prepared by the Central Transportation Planning Staff (CTPS) in May, 1994. The full CTPS ridership projections memo is included in Appendix, Section 2.0. CTPS projected that in 1996 the Southborough Station would attract 550 daily round trip commuters. It is expected that 83 of these would be dropped off at the station. The remaining 467 would be Park'n'Ride patrons. Based on a vehicle

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Approx. Scale: 1" = 1750

0 1750

1992 Average Daily Traffic & 1992 Average Weekday Traffic
SOUTHBOROUGH, MA

FIGURE 15.1-3

occupancy rate of 1.12, the 467 Park'n'Ride patrons would result in a demand for 417 parking spaces.

The patrons of the Southborough Station are projected to originate from the Towns of Hopkinton, Marlborough, Southborough, Upton, and Westborough. Table 15.1-4 shows the town of origin of the projected Southborough Station riders.

Table 15.1-4 Projected Patrons of Southborough Station Year 1996

Town	Riders
Hopkinton	92
Marlborough	228
Southborough	90
Upton	80
Westborough	60
TOTAL	**550**

The impact of the commuter rail riders on area streets as they travel to the Southborough Station is determined by assigning those commuters to a particular route. Riders who live in Southborough would utilize a variety of travel routes depending on the location of their residence.

The ridership from Hopkinton and Upton would use northbound Route 85 as the primary travel route, generally destined for the parking lot south of the tracks. Marlborough commuters would use southbound Route 85 while Westborough commuters will arrive from Route 9 eastbound to Route 85 southbound and from Flanders Road to Southville Road.

Figure 15.1-4 shows the distribution and percentage of station related traffic that would use Southborough area roadways.

Assignment of Riders to Trains

Commuter rail riders to the Southborough Station would arrive at the Southville Road/River Street Station to catch one of four A.M. peak period trains and would leave the station in the P.M. peak period based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several existing commuter rail lines. The observations of distribution by train tend to show the greatest number of riders on the trains arriving at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, the observations also shows greater ridership in the middle of what is normally considered peak commuting period.

1996 Traffic Impacts

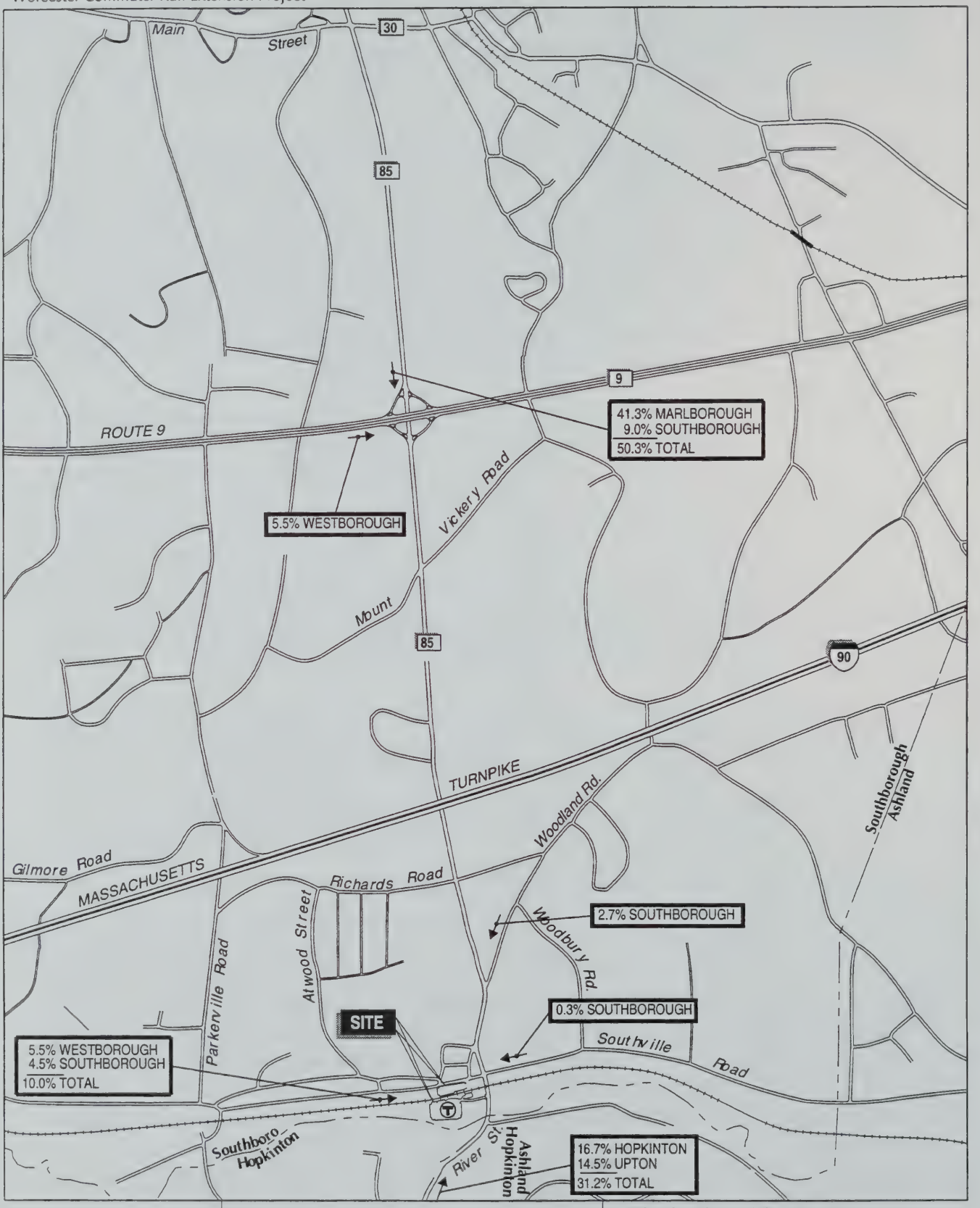
The 1996 traffic impacts must also consider background growth of traffic in addition to existing traffic volumes and the new riders destined for the station. Background growth is usually determined by tracking historical growth rates of permanent count locations. During the 1980's, traffic grew at rates of 2 - 3% or more a year in many areas. Data from permanent count locations in Southborough showed mixed results with an average growth of 0.3%. As a conservative approach, 0.5% annual growth of traffic volumes was assumed from 1992 to 1996.

The traffic impacts of both a "No Build" and "Build" alternative were analyzed. The 1996 "No Build" alternative allows a comparison with the 1996 traffic impacts of building the commuter rail station. It is assumed that 50% of the traffic generated by the proposed commuter rail station from the towns of Hopkinton and Upton is existing traffic already by passing the site on Route 85. This is because Route 85 is a primary route for commuter traffic from Hopkinton and Upton to access Route 9 and downtown Boston. Therefore, only 50% of the traffic from these communities projected to use the proposed station is considered as new to the study area roadway network. The new traffic generated by the station was added to the 1996 "No Build" volumes to develop the "Build" condition volumes.

The peak hour and peak generator hour overlap by 30 minutes in the A.M. period and 15 minutes in the P.M. peak period. Both the peak hours and the peak generator hours were analyzed to determine the greatest impacts to the study area roadways.

Tables 15.1-5 through 15.1-8 present the results of the LOS analysis for the signalized and unsignalized intersections. The tables reflect "No Build" and "Build" conditions for the peak hours and peak generator hours.

Table 15.1-5 and 15.1-6 show that in the "No Build" condition the River Street/Southville Road intersection is operating at an unacceptable level of service in both the A.M. and P.M. peak hours as well as the A.M. generator hour. The poor level of service is primarily the result of the existing signal timings. By optimizing the signal timing to be more responsive to actual traffic conditions the level of service can be improved significantly. As shown in the tables, in the "Build" condition with optimized signal timing the intersection will operate at acceptable levels of service. The Cordaville Road/Main Street intersection operates at acceptable levels of service



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

0 1750

Distribution of Commuter Rail Station Traffic
1996 BUILD ALL STATIONS
SOUTHBOROUGH STATION

FIGURE 15.1-4

for all peak hours under both the "No Build" and "Build" conditions. The northbound approach operates at LOS F in the A.M. peak hour. Both the westbound and northbound approaches experience a reduction to LOS F in the A.M. peak generator hour.

As shown in Tables 15.1-7 and 15.1-8 the unsignalized intersections generally operate at acceptable levels of service under the "No Build" and "Build" conditions. Woodland Road will function at LOS F in the P.M. peak hour under both "No Build" and "Build" conditions. Under the "Build" condition, traffic turning from Cordaville Road to River Street will experience a decline from LOS E to LOS F in the A.M. peak hour, while traffic on Woodland Road will experience a decline from LOS E to LOS F in the P.M. peak generator hour.

Tables 15.1-9 and 15.1-10 lists the results of the roadway segment analysis.

As shown in the tables, all roadway segments operate at acceptable levels of service under both the "No Build" and "Build" condition.

Table 15.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southville	F	C	F	D
Eastbound	B	C	B	C
Westbound	B	D	B	D
Northbound	F	B	F	B
Southbound	F	D	F	E
Cordaville and Main	D	E	D	E
Eastbound	B	C	B	D
Westbound	C	E	C	F
Northbound	F	F	E	F
Southbound	B	C	D	B

Table 15.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southville	F	C	D	B
Eastbound	B	C	B	C
Westbound	B	D	B	C
Northbound	C	B	B	B
Southbound	F	B	E	B
Cordaville and Main	C	C	B	B
Eastbound	C	B	B	B
Westbound	D	C	C	C
Northbound	B	C	B	C
Southbound	B	C	B	B

Table 15.1-7 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southern Lot				
LT from NB River	-	A	-	A
LT and RT from Southern Lot	-	C	-	C
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Northern Lot	A	A	A	A
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	A	A	A	A
LT and RT from Cordaville	E	F	E	E
Cordaville and Woodland				
LT from SB Cordaville	A	A	A	A
LT and RT from Woodland	E	E	E	E
NB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	B	B	B	B
SB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	A	B	A	B
NB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A

Table 15.1-8 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southern Lot				
LT from NB River	-	A	-	A
LT and RT from Southern Lot	-	D	-	D
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Northern Lot	A	A	A	A
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	A	A	A	A
LT and RT from Cordaville	E	E	D	E
Cordaville and Woodland				
LT from SB Cordaville	A	A	A	A
LT and RT from Woodland	F	F	E	F
NB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	A	A	A	A
SB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	B	B	A	A
NB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A

Table 15.1-9 1996 Road Segment Level of Service - A.M. Peak Hours

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River South of Site	D	E	D	E
Southville West of Site	C	D	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	D	E
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	E	E

Table 15.1-10 1996 Road Segment Level of Service - P.M. Peak Hours				
Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River South of Site	E	E	D	D
Southville West of Site	C	C	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	D	D
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	D	D

1996 Traffic Impacts - Southborough Station Only

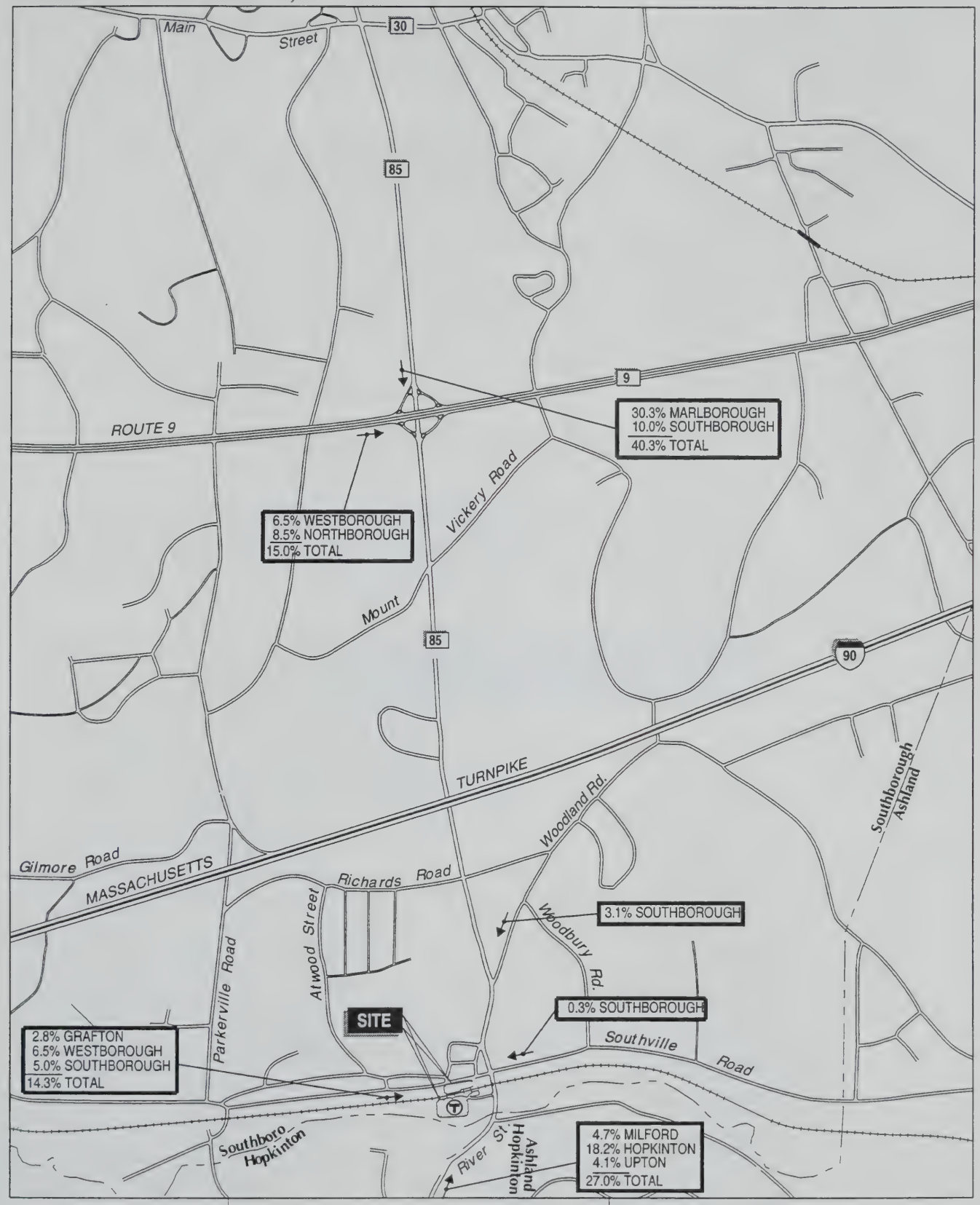
In order to address an upper limit, worse case situation with regard to traffic impacts on Southborough streets, an analysis was performed which considered that the Southborough commuter station was the only station built by 1996 (in addition to a Worcester Station).

CTPS projected that under this scenario, the Southborough Station would attract 636 daily round trip commuters, 585 of which would be Park'n'Ride patrons. Site traffic was distributed over the roadway network in a manner similar to that used for the 1996 "Build All Stations" scenario. The projected distribution is shown in Figure 15.1-5.

A LOS analysis was performed for the peak hour and peak generator hour for the "Build" condition. The "No Build" condition is the same as previously presented for the "Build All Stations" scenario.

Table 15.1-11 through 15.1-14 present the results of the LOS analysis for the signalized and unsignalized intersections.

As shown in the tables, in the "No Build" condition, the River Street/Southville Road intersection operates poorly in the A.M. and P.M. peak hours and the A.M. generator hour. As in the previous 1996 analysis these levels of service can be markedly improved by optimizing the traffic signal timing. As shown, under the "Build" condition with optimized signal timing the intersection will operate at acceptable levels of service in both peak and peak generator hours. The Cordaville Road/Main Street intersection operates acceptably in the peak and peak generator hours under both "No Build" and "Build" conditions. Under both "No Build" and "Build" conditions the northbound approach is at LOS F in the A.M. peak hour. In the



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1750±

0 1750

Distribution of Commuter Rail Station Traffic
1996 BUILD Southborough Only
SOUTHBOROUGH STATION

FIGURE 15.1-5

"Build" condition the westbound and northbound approaches are at LOS F in the A.M. peak generator hour.

Tables 15.1-13 and 15.1-14 indicate that the unsignalized intersections generally operate acceptably under both the "No Build" and the "Build" conditions. Traffic from Woodland Road to Cordaville Road operates at LOS F in the P.M. peak hour under both conditions. In the "Build" condition, traffic turning from Cordaville Road to River Street functions at LOS F in the A.M. peak hour and A.M. peak generator hour. Also in the "Build" condition, P.M. peak generator hour traffic turning from Woodland Road to Cordaville Road operates at LOS F.

The results of the roadway segment analysis are presented in Tables 15.1-15 and 15.1-16.

As shown, all roadway segments operate at acceptable levels under both the "No Build" and "Build" conditions. Two segments experience minor LOS reductions in the A.M. peak hour and one segment has a minor LOS reduction in the A.M. peak generator hour.

Table 15.1-11 1996 Signalized Intersection Level of Service - A.M. Peak Hours (Southborough Station Only)

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southville	F	D	F	D
Eastbound	B	C	B	C
Westbound	B	E	B	E
Northbound	F	B	F	B
Southbound	F	D	F	E
Cordaville and Main	D	E	D	E
Eastbound	B	C	B	C
Westbound	C	E	C	F
Northbound	F	F	E	F
Southbound	B	C	B	C

Table 15.1-12 1996 Signalized Intersection Level of Service - P.M. Peak Hours (Southborough Station Only)

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southville	F	B	D	B
Eastbound	B	C	B	C
Westbound	B	D	B	C
Northbound	C	B	B	B
Southbound	F	B	E	B
Cordaville and Main	C	C	B	B
Eastbound	C	B	B	B
Westbound	D	C	C	B
Northbound	B	C	B	C
Southbound	B	C	B	B

Table 15.1-13 1996 Unsignalized Intersection Level of Service - A.M. Peak Hours (Southborough Station Only)

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southern Lot				
LT from NB River	-	A	-	A
LT and RT from Southern Lot	-	C	-	D
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Northern Lot	A	A	A	A
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	A	A	A	A
LT and RT from Cordaville	E	F	D	F
Cordaville and Woodland				
LT from SB Cordaville	A	A	A	A
LT and RT from Woodland	E	E	E	E
NB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	B	B	A	B
SB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	A	B	A	B
NB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A

Table 15.1-14 1996 Unsignalized Intersection Level of Service - P.M. Peak Hours (Southborough Station Only)

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southern Lot				
LT from NB River	-	A	-	A
LT and RT from Southern Lot	-	D	-	E
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Northern Lot	A	A	A	B
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	A	A	A	A
LT and RT from Cordaville	E	E	D	E
Cordaville and Woodland				
LT from SB Cordaville	A	A	A	A
LT and RT from Woodland	F	F	E	F
NB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	A	A	A	A
SB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	B	B	A	A
NB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A

Table 15.1-15 1996 Road Segment Level of Service - A.M. Peak Hours (Southborough Station Only)

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River South of Site	D	E	D	E
Southville West of Site	C	D	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	D	E
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	E	E

Table 15.1-16 1996 Road Segment Level of Service - P.M. Peak Hours (Southborough Station Only)

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River South of Site	E	E	D	D
Southville West of Site	C	C	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	D	D
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	D	D

2001 Traffic Impacts

The level of service analysis is again presented for the Southborough intersections and roadway segments using year 2001 traffic volumes and ridership projections. Since the Southborough Station will be at capacity and the Ashland Station near capacity, it is anticipated that some Hopkinton commuters using the Ashland Station would shift to Southborough causing some Upton and Westborough commuters to shift from the Southborough Station to the Westborough Station. These shifts will cause a slight reorientation in the traffic patterns for the year 2001. Background growth of traffic amounting to 1.5% per year was assumed for the period 1996 to 2001.

CTPS projected that Southborough Station is expected to attract 553 daily round trip commuters in the year 2001, 470 of which will be Park'n'Ride patrons. Distribution of traffic is essentially the same as shown in Figure 15.1-4.

A LOS analysis was prepared for both peak hours and peak generator hours for the "No Build" and "Build" conditions.

The results of the analysis for the signalized and unsignalized intersections are presented in Tables 15.1-17 through 15.1-20.

The River Street/Southville Road intersection is expected to operate at unacceptable levels of service under the "No Build" condition. However, as shown in the tables, with proper signal timing the intersection will operate acceptably in the "Build" condition. The Cordaville Road/Main Street intersection is expected to operate at in LOS F in the A.M peak hour "No Build" condition. In the "Build" condition the intersection is anticipated to function at LOS F in both the A.M. peak hour and A.M. peak generator hour.

As indicated in Tables 15.1-19 and 15.1-20 the unsignalized intersections generally will operate at acceptable levels of service under both "No Build" and "Build" conditions. As in the 1996 analysis, traffic turning from Cordaville Road to River Street and from Woodland Road to Cordaville Road will operate unacceptably at certain peak periods in the "No Build" and "Build" conditions.

Tables 15.1-21 and 15.1-22 present the results of the roadway segment analysis.

As shown, all segments operate at acceptable levels of service under the "No Build" and "Build" conditions.

Table 15.1-17 2001 Signalized Intersection Level of Service - A.M. Peak Hours

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southville	F	D	F	D
Eastbound	B	C	B	D
Westbound	B	E	B	E
Northbound	F	C	F	B
Southbound	F	E	F	E
Cordaville and Main	F	F	E	F
Eastbound	C	D	C	D
Westbound	D	F	D	F
Northbound	F	F	F	F
Southbound	C	C	B	C

Table 15.1-18 2001 Signalized Intersection Level of Service - P.M. Peak Hours

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southville	F	C	E	B
Eastbound	B	C	B	C
Westbound	B	D	B	C
Northbound	F	B	B	B
Southbound	F	C	F	B
Cordaville and Main	D	C	C	C
Eastbound	C	B	B	B
Westbound	F	D	D	C
Northbound	B	D	B	C
Southbound	B	C	B	B

Table 15.1-19 2001 Unsignalized Intersection Level of Service - A.M. Peak Hours

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southern Lot				
LT from NB River	-	A	-	A
LT and RT from Southern Lot	-	C	-	D
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Northern Lot	B	B	A	A
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	A	A	A	A
LT and RT from Cordaville	F	F	E	F
Cordaville and Woodland				
LT from SB Cordaville	B	A	A	A
LT and RT from Woodland	E	E	E	E
NB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	B	B	B	B
SB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	A	B	A	B
NB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A

Table 15.1-20 2001 Unsignalized Intersection Level of Service - P.M. Peak Hours

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River and Southern Lot				
LT from NB River	-	A	-	A
LT and RT from Southern Lot	-	D	-	E
Southville and Cordaville				
LT from EB Southville	A	A	A	A
LT from WB Southville	A	A	A	A
All from Northern Lot	A	B	A	A
All from Cordaville	A	A	A	A
Cordaville and River				
LT from NB River	B	B	A	A
LT and RT from Cordaville	E	E	D	E
Cordaville and Woodland				
LT from SB Cordaville	A	A	A	A
LT and RT from Woodland	F	F	E	F
NB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	A	A	A	A
SB Cordaville and EB Ramps				
RT from Route 9 EB Ramp	C	B	A	A
NB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	A	A	A	A
SB Cordaville and WB Ramps				
RT from Route 9 WB Ramp	B	B	A	A

Table 15.1-21 2001 Road Segment Level of Service - A.M. Peak Hours

Southborough	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River South of Site	E	E	E	E
Southville West of Site	D	D	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	E	E
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	E	E

Table 15.1-22 2001 Road Segment Level of Service - P.M. Peak Hours

Southborough	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
River South of Site	E	E	D	D
Southville West of Site	C	C	C	C
Cordaville North of River	E	E	E	E
Cordaville North of Woodland	E	E	D	D
Cordaville South of Route 9	E	E	E	E
Cordaville North of Route 9	E	E	D	E

Summary of Findings

Generally, the streets and intersections in the Southborough study area function at acceptable levels of service for both the "No Build" and "Build" conditions. However, some locations operate unacceptably during certain peak periods under both conditions.

The River Street/Southville Road intersection operates unacceptably in the "No Build" condition. However, with proper signal timing the intersection will function efficiently with acceptable levels of service.

The Cordaville Road/Main Street intersection, while operating at acceptable levels in 1996, is expected to deteriorate to unacceptable levels during the A.M. peak periods in 2001. It appears this is due to normal traffic growth and will occur with or without the commuter rail station.

Traffic turning from Cordaville Road to River Street and traffic turning from Woodland Road to Cordaville Road experience unacceptable levels of service under both "No Build" and "Build" conditions. The Town of Southborough has expressed a desire to make improvements at these locations in conjunction with the commuter rail project.

Proposed mitigation and mitigation options in Southborough are discussed in Section 15.12 of this DEIR.

15.2 Air Quality

Employing the rationale and methodology described for the Millbury Route 122 Station analysis, the intersection of Cordaville Road (Route 85) and Main Street (Route 30) was selected for the analysis (see Figure 15.1-1). Consideration was given for the River Street (Route 85) and Southville Road intersection, but the optimization for the signal timing at this location would correct the existing deficiency and CO concentrations would be less than at the Route 85/Route 30 intersection.

In order to simulate the highest CO concentrations, receptor locations were established along the sidewalk areas nearest to the traffic lanes. The offsets are 15 feet from the center of both Cordaville Road and Main Street. The results for the year 1996 are as follows in Table 15.2-1.

Table 15.2-1 1996 CO Concentrations - Route 85/Route 30 Intersection

	1-Hour CO (ppm)		8-Hour CO (ppm)	
	No Build	Build	No Build	Build
Southeast Sidewalk	6.8	6.7	4.8	4.7
Southwest Sidewalk	6.3	6.4	4.4	4.5
Northwest Sidewalk	6.0	6.4	4.2	4.5
Northeast Sidewalk	6.2	6.5	4.3	4.6

The predicted CO concentrations are only slightly higher for the "Build" versus the "No Build" conditions for both the 1-hour and 8-hour periods, with the exception of the southeast sidewalk which exhibits a decrease of 0.1 ppm under the "Build" condition for both time periods. All values are well below the 35 ppm for the 1-hour standard and 9 ppm for the 8-hour standard. Additional receptors evaluated included 3 single-family dwellings, the Town Library, the Police/Fire Station and the American Legion Post. The predicted CO concentrations for the 1-hour case range from 3.6 ppm for the "No Build" to 5.0 ppm for the "Build" condition. Similarly the 8-hour values range from 2.5 ppm to 3.5 ppm. Most predicted concentrations are the same or only slightly higher for "Build" versus "No Build". Intersection improvements, which could include exclusive turn lanes to alleviate queued traffic conditions, are a possibility as mitigation for Southborough Station generated traffic through this intersection. If improvements are implemented, the predicted CO concentrations would be less than shown above.

15.3 Noise and Vibration

Noise Impact Analysis Methodology

Because of slow train speeds near stations, the potential for noise and vibration impacts from train operations are at a minimum compared to other segments of the right-of-way. There is, however, the potential of effects on the noise and vibration environment in the vicinity of the station because of project-induced traffic on roads leading to and from station areas, as well as short-term effects during construction of platforms, parking and other site facilities.

Traffic Noise

The significance of noise impacts from project-generated traffic near proposed commuter rail stations along the corridor was assessed based on the projected noise increase relative to the noise from existing traffic on applicable roads. Because the greatest changes in traffic volumes are expected to occur during peak commuting periods, the noise increase was evaluated in terms of the peak-hour L_{eq}.

Criteria for traffic noise impact are based on existing FTA guidelines, and state that a noise level increase of greater than 5 dBA is considered to represent impact. The existing FTA criteria are used here rather than the proposed FTA criteria used in the train noise assessment because of the general, non-site specific nature of the traffic noise impact assessment. Where the existing layout of major roads will essentially remain the same, the traffic noise assessment predicts only the change in noise resulting from the projected change in traffic volumes near the stations, and not the absolute traffic noise levels at specific noise-sensitive locations in the community.

The traffic noise analysis was carried out on a relative basis, by estimating the change in peak-hour traffic noise, which is a function of the change in peak-hour traffic volume. The assumption is that all other non-project related noise sources remain unchanged.

Construction Noise and Vibration

The construction of a fixed facility such as a commuter rail station is expected to include clearing, excavation, foundation work, equipment installation, paving and finishing. Construction machinery is likely to include the types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes and trucks. Construction will typically occur during 8 to 10 hour weekday, daytime periods.

Construction of the station can be categorized in two distinct operations—parking lots and platform areas—with total duration of construction estimated to be approximately eight months.

For a typical station site, the distance to significant noise impact was estimated to be 200 feet measured from the closest area of construction. In cases where noise-sensitive land uses were concentrated in a location very close to either the platform area or the parking area, separate screening distances were used to assess the two construction scenarios.

Station construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Usage factors were assigned to each piece of equipment to determine a cumulative reference noise level to use in determining the width of the noise impact zone.

Noise impact criteria for construction are based on the outdoor Annual Average Day-Night Equivalent Sound Level (AA L_{dn}), with a threshold of 65 AA L_{dn} defining the impact zone. This metric is slightly less conservative than the 24-hour L_{dn} used for train noise impact, given the short-term nature of construction noise impact. (A complete definition of metrics and terms pertaining to noise and vibration used in this report are given in Appendix, Volume II, Section 3.0).

The impact criteria for construction vibration are essentially the same as for train operations, except that impact is assessed only when the activity will occur for 30 days or more at a given location. Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990) . Vibration projections were made for the main equipment categories, based on the relative amount of energy imparted to the ground. Details on this methodology are given in Appendix 3.0. A screening distance of 85 ft measured from nearest area of construction was estimated for vibration impact from general construction activity at stations.

Traffic Noise Impacts

There are scattered residences along the north side of Southville Road directly across from the proposed Southborough Station site, on both sides of Southville Road just west of the station, and on River Street (Route 85) to the northeast of the station site. These homes are typically 40 to 50 feet from the roadway centerline.

No significant re-alignment or addition of roadways is proposed for Southborough station. Hence, a relative increase in peak-hour L_{eq} was estimated for assessing project-generated traffic noise impact. The peak-hour traffic volume on both Southville Road and River Street is projected to increase by a factor of 1.1, resulting

in less than 1 dBA increase in the peak-hour L_{eq}. No noise impact from traffic, therefore, is projected for the Southborough Station area.

Construction Noise and Vibration Impacts

Three residences on Southville Road will experience noise impact from construction, while two of these residences will be subject to vibration impact. For construction activities south of the railroad, there are no existing residential structures within the screening distances for either construction noise impact or vibration impact.

Traffic Noise Mitigation

No significant traffic noise impact was identified for the Southborough station.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures can be implemented:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers, and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

During the project design phase, specific construction noise limits will be developed and incorporated into the contract specifications, along with requirements for noise monitoring to certify compliance with the specified limits.

All of the potential vibration impacts from construction identified are related to annoyance effects and not to building damage effects, and will occur only during daytime hours. Following are some procedures that can be used to minimize the potential for annoyance from construction vibration:

- Restrict procedures that contractors can use in vibration-sensitive areas, and specify alternative techniques that generate lower vibration levels.
- Restrict the hours of vibration-intensive activities and the use of heavy-duty equipment to weekdays during daytime hours.
- Require vibration monitoring during vibration-intensive activities.

15.4 Site Drainage

The proposed Southborough Station is within the Sudbury River watershed. Existing land uses include a general store with associated unpaved parking north of the tracks and a contractor storage yard south of the tracks. The site area north of the railroad tracks slopes generally in an easterly direction. Stormwater runoff currently is directed to a stormdrain collection system in Southville Road and River Street (Route 85) and ultimately discharges into the Sudbury River. The proposed station area south of the tracks slopes in both a southerly and easterly direction. Stormwater runoff currently drains entirely by overland flow into the Sudbury River.

A subsurface exploration program was performed for the site, which consisted of 5 soil borings and 11 test pits. Subsurface conditions north of the tracks consisted typically of a 5 foot to 10 foot layer of fine to coarse sands and gravels, underlain by a very dense material (refusal). South of the tracks, subsurface conditions consisted typically of a 5 foot to 8 foot layer of construction fill (boulders, cobbles, sands, silts, etc.) underlain by fine to coarse drained sands and gravels. Depth to groundwater varies between 9 feet and 19 feet.

The proposed project development will consist of 420 paved parking spaces (90 spaces north and 330 spaces south of the tracks), sidewalks, train platforms, ramps, stairs, a pedestrian overpass and landscaping. As discussed in Section 3.0, the project also proposes to widen and reconstruct the existing railroad bridge over Route 85. This work will attempt to improve existing roadway drainage conditions and alleviate some of the existing flooding conditions along Route 85.

Best Management Practices (BMPs) will be implemented to mitigate any stormwater impacts generated by this project. Water quality BMP's will include catch basins with sumps and oil and grease traps. Catch basin sumps are very effective in removing larger sized sediments, with associated contaminants, from parking lot runoff.

General maintenance of the station will include the implementation of a regular parking lot sweeping program. One objective of a sweeping maintenance program is to remove as many contaminants as possible from the parking lot surface before they are washed into the stormwater collection system. Studies have determined that a large percentage of contaminant loads are bound to particulates (silt and sand particles) and thus a regular sweeping program will be effective in reducing pollutant loadings and improving runoff water quality. Cleaning of catch basins remove additional course sediment and large debris from the stormdrain system.

The maintenance program also will include the removal of trash, leaves and fallen branches. This will not only reduce loadings of nutrient related contaminants, but will keep the stormwater collection system clear and working properly.

Stormwater runoff from the parking area north of the tracks will connect into the existing drainline in Southville Road. Stormwater runoff from the south parking lot will flow through a combination of stilling basins and diversion swales before discharging into the Sudbury River. These BMP's will serve to avoid any potential for soil erosion and enhance water quality.

No stormwater detention facility is proposed for this station. Typically detention facilities are designed temporarily to store stormwater runoff and release it at a controlled rate so that peak flow rates will not be exceeded at the discharge point. The project site discharge point is the Sudbury River at the concrete box culvert under Route 85. Because the project site lies at the bottom of a very large watershed, it becomes advantageous to discharge the site runoff quickly before the larger peak flows from the remaining watershed arrive. If stormwater were detained on site, the peak detention pond outflows may coincide with remaining watershed peaks and actually increase the peak flow rates. Calculations determining pre and post quantities of runoff for the 10 year and 100 year design storm are presented in Appendix Volume II, Section 5.

All final design elements including implementation of a Vegetative Management Plan (VMP) to control overgrowth within stilling basins and diversion swales will be coordinated with and reviewed by the Southborough Conservation Commission.

Water Supply

Southborough is served by the Massachusetts Water Resources Authority for its public water supply. A private drinking water supply well is located approximately one eighth mile upgradient of the station site. The adjacent area of Hopkinton is served by private wells. The storm drainage from the proposed station site would drain into the Sudbury River and most likely would not relate hydrologically to any wells in the vicinity.

15.5 Wetlands and Wildlife

The Sudbury River and the Cordaville millpond are the dominant wetland resources associated with the Southborough station site. Other resources include bordering vegetated wetlands and bordering land subject to flooding. Subsurface investigations

indicate that layers of fill have been placed adjacent to the river, on the site of the former woolen mill. The historical land use as a rail yard and woolen mill have altered the wetland environment since at least the mid 1800's. The pond, which is an empoundment on the Sudbury River, has a main overflow structure/dam. A second outlet structure for the raceway that was constructed for the mill operation is no longer used. The pond is occasionally stocked with trout and supports warmwater fish species.

Streams and wetlands north of the station site have records of Spotted Turtles and Wood Turtles, species of Special Concern, but these areas are outside of the project area and would not be disturbed by the proposed project.

The footprint of the proposed station site parking lot would be within the 100 foot buffer zone of the Sudbury River. A portion of the access road to the south lot and several other parts of the southern portion of the site would be within an area of bordering land subject to flooding (100 Year floodplain). Compensatory flood storage will be provided for the 6,200± cf volume of floodplain filled by the proposed construction. The supporting data and calculations for the quantities of bordering land subject to flooding and proposed compensatory areas are included in Appendix Volume II, Section 5.

Development of a commuter rail station at this site provides an opportunity to enhance recreational activities associated with the Sudbury River and Cordaville Pond. Coordination with the Southborough Conservation Commission, the Massachusetts Fish and Wildlife Service and the Sudbury Valley Trustees during the design of the station will ensure that recreational resources are protected or enhanced.

15.6 Historic Properties/Sites

The Southborough Station site is located in Cordaville, a nineteenth-century mill village. The Cordaville Mill site, which will be affected by the construction of the station, contains three stone-arch bridges that will be evaluated for their potential eligibility to the National Register. In addition, the mill village itself will be affected visually by the proposed station. See Appendix Volume II, Section 4.0 for additional information. There are approximately 15 architectural inventory forms to be completed for this site. The mill site was thoroughly investigated for interpretative potential with the idea of incorporating the bridges and archaeological remains into

the station setting. See Section 7.8 for a description of Southborough historic properties and sites.

15.7 Archaeological Resources

The archaeological reconnaissance survey that the MBTA undertook as part of the EIR process included the location of the proposed station in Southborough; an archaeologist was also on site to monitor the back-hoe excavations conducted for the hazardous materials investigation (Chapter 21E). The proposed Southborough station is located on the site of the Sanford mill, much of which is still visible east of the station location. The hazardous materials excavations, up to 12 feet deep, revealed a fill (including densely jumbled stone slabs) that included some late nineteenth- and twentieth-century artifacts, but did not reach the depth to expose intact mill structures. Construction of the Sanford mill and associated housing deeply and extensively disturbed the original landscape, and probably destroyed any prehistoric or earlier historic archaeological sites in the proposed station area. Consequently, the archaeological resources of the proposed station are probably limited to the mill and associated buildings themselves.

15.8 Visual Impacts

The proposed station facilities will be designed in a manner which is compatible with the historic nature of Cordaville and the small town character of Southborough. Related off-site improvements include street and intersection improvements. These improvements will not change the visual character of the area substantially.

Major visual features of the station include parking lots on both the north and south sides of the track and vertical elements such as the station platform canopy, a pedestrian overpass structure, and light poles.

The parking lot on the north side of the railroad tracks will have a landscaped buffer area ranging from 10 to 15 feet in width between the paved area and Southville Road. There also will be additional landscaping between the parking lot and station platform.

The parking lot on the south side of the railroad tracks will be larger but set back about 380 feet from River Street. Because the lot is further removed from the

residential areas of Cordaville, it will not be a dominating visual influence. The south side parking lot will have plantings in some of the parking lot islands in order to soften the visual impact of a large area of asphalt.

The pedestrian overpass, connecting the platforms on either sides of the tracks, will be the dominant vertical element of the station. The overpass will clear the tracks by 21 feet and, with its covered roof, have a total height of about 30 feet. Covered stairways and covered ramps, in accordance with ADA access requirements, will extend from the station platforms to the overpass. The access ramps will be parallel to the tracks and rise up to half of the vertical difference between the platform and the overpass and then switch back 180 degrees in the other direction in order to maintain a grade of not more than 8 percent. The total length of the access ramp will be about 160 feet, but due to the switchback, the length exposed to view is only about 80 feet long. The community of Southborough has expressed concern over the appearance of the pedestrian overpass. The MBTA, however, is reluctant to proceed with an underpass since MBTA policy is to avoid underpasses wherever possible for safety and security reasons. Incorporation of cross track pedestrian traffic into the Route 85 bridge reconstruction was also considered, but deemed impractical because of excessive walking distance.

The in-bound (south side) platform will have a canopy to protect waiting commuters. It will be 150 feet in length and 15 feet in height.

The station and parking lots will be lighted from dusk to about one-half hour after the last train passes through the station in the evening. Photoelectric cells will turn on the lights and a time clock will turn them off. High pressure sodium cut-off luminaires will be used for lighting. As opposed to the normal street lights, the cut-off luminaires direct the light downward with minimal spillover to off-site areas. The light source from a cut-off luminaire is not visible to a pedestrian unless standing under the light. Typically, the light poles are 30 feet in height. The lights should not be a visual disturbance to the adjoining Cordaville neighborhood or to residents in Hopkinton.

Current plans call for landscaping and pedestrian access to the Sudbury River and the small pond west of the south side parking lot. Fencing will be introduced to preclude reaching the pond from the north side of the tracks by pedestrian grade crossings of the track. Access from the north side will be via the pedestrian overpass at the station.

Three stone arch bridges of mid-to-late nineteenth-century design, still in their original settings, along with other site features and historic associations with former mill operations, offer a unique opportunity for creative interpretative design.

The proposed design, including the combination of station and off-site improvements, will create a visually distinguished area around the commuter rail station which will be compatible with its immediate surroundings, as well as the small town character of Southborough.

15.9 Hazardous Materials

An environmental site evaluation was performed for the proposed Southborough Station site, in order to identify any hazardous materials or oil that may be contained within the soils or groundwater at the site. The evaluation was conducted per the requirements of Massachusetts General Law, Chapter 21E. See Figure 15.9-1 for locations of test sites.

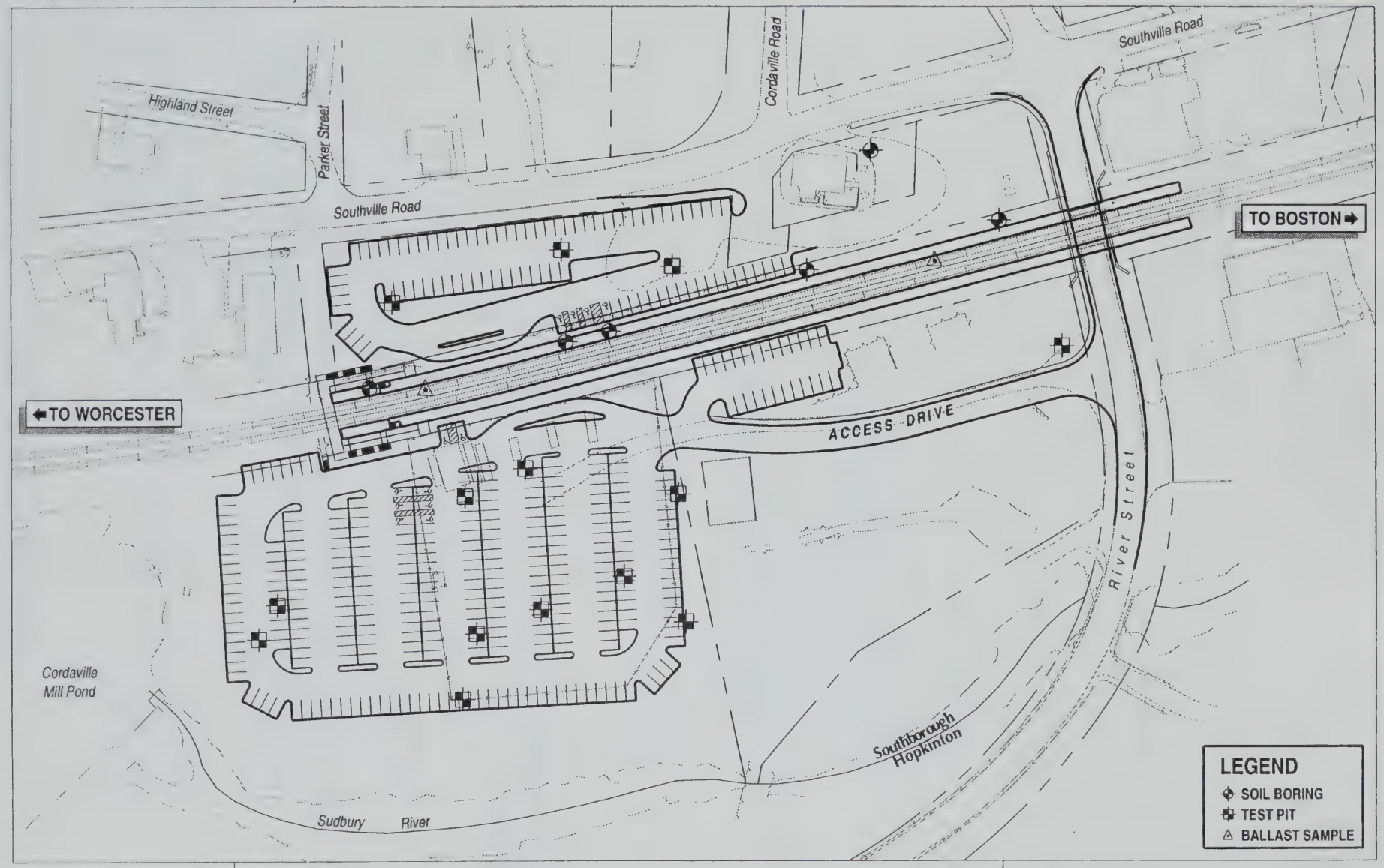
The environmental site evaluation included the following elements:

1. A review of the site's history, which confirmed that the southern portion of the site was occupied by the Cordaville Woolen Mill from approximately 1830 until the 1960s. The mill used dyes in the process of making blankets. The dyes and various associated chemicals were reportedly stored on site in unknown quantities.

2. A review of State and local records and information which indicated no releases of hazardous material or oil at the site or within ¼ mile upgradient of the site, and no other drinking water supplies, public or private, were identified within ¼ mile of the site, north of the Sudbury River.

3. A subsurface exploration program consisting of 5 soil borings and 11 test pits. No groundwater was encountered in 5 of the test pits. The soil boring and test pit logs are available at the MBTA project office. Soil samples were taken at each of the borings and test pits. Groundwater samples were taken at 4 of the test pits.

4. Soil and groundwater sample were analyzed in a laboratory by chemical screening methods.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'

0 125

SITE PLAN - HAZARDOUS MATERIALS INVESTIGATION (21E) SOUTHBOROUGH, MA

FIGURE 15.9-1

The results of the environmental site evaluation indicate that although trace to low levels of volatile organic compounds and cadmium are present in the soil on the southern portion of the site, the levels of contaminations detected were well below the reportable concentrations contained in the Massachusetts Contingency Plan for soils in high environmental impact areas. Specifically, the results indicated the following:

- Screening for volatile organic compounds (VOCs) indicated the presence of benzene, toluene, and acetone at concentrations below the method detection limit of 5 parts per billion in one of the soil samples. Further VOC analyses did not confirm the presence of VOCs. In addition, no petroleum hydrocarbons were detected in that sample.
- Priority pollutant metals analyses from 2 soil samples (taken at locations down gradient of the former sluiceway) did not detect contamination of metals above normal background levels.
- No VOCs were detected in any of the four groundwater samples. Analyses of pH and specific conductance in the groundwater samples indicated typical readings for New England groundwater.
- Neither polychlorinated biphenyl nor petroleum hydrocarbons were detected in the composite ballast sample collected from the railroad bed.

15.10 Pedestrian Safety

The CTPS ridership projections do not forecast any patrons walking to the Southborough Station; however, its location near residential areas and the proximity of the convenience store make pedestrian activity likely. A sidewalk is proposed to be constructed from the station easterly on the south side of Southville Road to River Street, than southerly along the west side of River Street (if the Route 85 bridge is reconstructed) to meet the station parking access road sidewalk south of the railroad tracks. The MBTA plans to construct other sidewalks in the immediate area, the length and locations to be determined by consulation with town officials.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge, accessible to the handicapped, will be constructed over the tracks to connect station platforms to parking facilities.

15.11 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation,and safety. Station site work will involve clearing, excavation, foundation construction, paving and installing/erection of site facilities such as pedestrian bridges and station canopies. Construction equipment likely to be used includes graders, bulldozers, backhoes, cranes and trucks.

Construction related traffic impacts are not expected to be significant. During certain short-term phases of construction, there will be concentrated deliveries of materials, such as during paving of the parking areas. Station construction will not be particularly labor-intensive, either, and traffic generated by the labor force will not adversely affect level of service on nearby roads.

There will be short-term, intermittent increases in emissions from construction equipment and site-related construction traffic. No violations of air quality standards are anticipated.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of an order-of-conditions issued by the Southborough Conservation Commission will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise and vibration impacts and possible mitigation are described in the preceding Section 15.3.

Station site construction activities that present a potential safety concern would be secured by temporary fencing or other barriers. The Contractor will be required to adhere to all pertinent regulations regarding use and storage of hazardous or toxic materials on the site.

15.12 Proposed Mitigation and Mitigation Options

The streets and intersections within the Southborough study area were reviewed to identify those locations that may require mitigation in accordance with the MBTA Mitigation Policy outlined in Section 3.7. The intersections which meet the outlined criteria are discussed below.

The intersection of Cordaville Road and Main Street deteriorates from LOS E to LOS F in the year 2001 A.M. peak generator hour. A review of turning movement count data indicates moderate left turn volumes in the peak hours, particularly on the northbound and westbound approaches. To accommodate the left turn volume and to improve overall operating efficiency of the intersection, exclusive left turn only lanes should be constructed. Although impacts associated with commuter rail generated traffic could be mitigated by improvements only to Route 85, this would appear to be a short term solution. Long term planning would suggest that capacity improvements be made to the entire intersection. This would involve left turn only lanes on each approach, new signalization, and improved turning radii for each approach.

Impacts associated with making improvements either to Route 85 only or to the entire intersection include land acquisition, grading impacts, tree removal and drainage impacts. Land acquisition costs may significantly increase the total cost of improving the entire intersection as opposed to making short term improvements to Route 85.

The intersection of Cordaville Road and River Street will experience a reduction in level of service from LOS E to LOS F in the 1996 A.M. peak hour. The Town of Southborough has expressed interest in closing Cordaville Road at its intersection with River Street. This would divert traffic through the signalized intersection at River Street and Southville Road.

Two analyses were conducted to determine the effects of the additional traffic at the River Street/Southville Road intersection. The first analysis assumed no improvements in geometry or signal phasing at the intersection. The second analysis assumed the addition of left turn only lanes on each approach with a revised signal phasing and improved turning radii.

The first analysis, with no improvements to the intersection, indicates that the additional traffic will cause level of service to deteriorate to LOS F in the A.M. peak hour and LOS E in the P.M. peak hour.

The results of the second analysis, with improvements to the intersection, show that an acceptable level of service (LOS D) can be obtained in the peak hours despite the additional traffic. However, the level of service, though acceptable, will be lower than the calculated level of service for the "Build" condition with the Cordaville Road/River Street intersection remaining open. Additionally, improvements to the turning radii would likely involve land takings.

Impacts associated with the closing of Cordaville Road and related improvements to the Southville Road/River Street intersection include land acquisition, grading impacts, new signalization and probable drainage impacts.

Traffic turning from Woodland Road to Cordaville Road operates at LOS F under both existing and "No Build" conditions. In the "Build" condition the movement will continue to operate at LOS F with some decrease in reserve capacity. The Town has suggested that the intersection be reconstructed to create a "T" type intersection. While the improved geometry is desirable, it would not increase the capacity on Woodland Road and would require acquisition of the existing gas station at the intersection. Even with the improvements, Woodland Road would continue to operate at LOS F in the peak hours.

SECTION 16.0 ENVIRONMENTAL IMPACTS—ASHLAND STATION

The Draft EIR evaluates potential environmental effects of two station sites in Ashland. Both propose parking for 700 vehicles, with parking divided between lots north and south of the railroad tracks. Site plans for the station alternatives are shown successively on Figures 16.0-1 and 16.0-2.

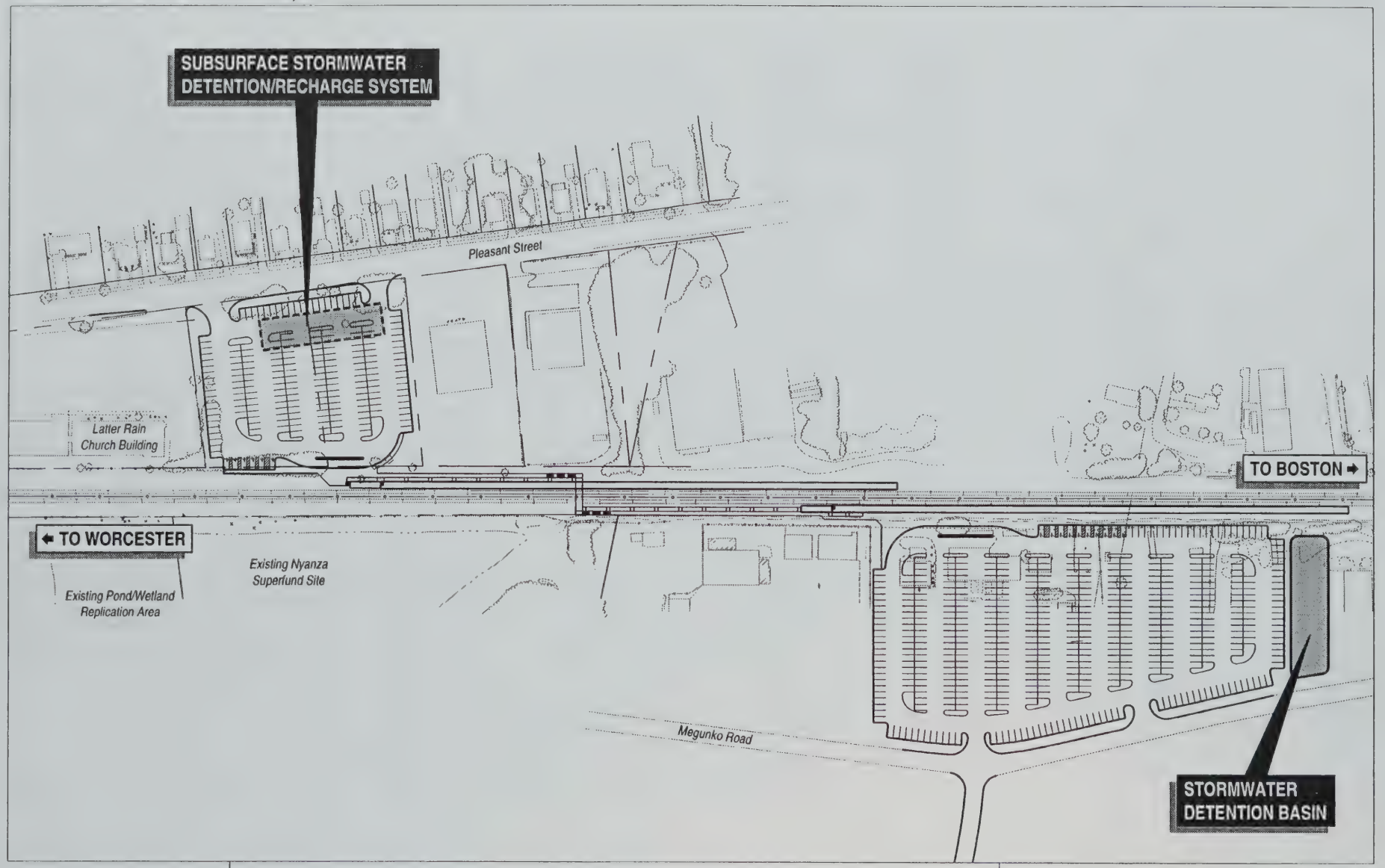
The Ashland Station-East alternative would construct parking north of the railroad tracks adjacent to the Latter Rain Church on Pleasant Street and south of the railroad tracks on Megunko Road. A new 3,000 foot long access road would be constructed to connect the south side parking to Route 135.

The Megunko Road parking lot abuts the Nyanza Superfund site and lies within the site's groundwater plume. Meetings and discussions have been held between the MBTA, the DEP, and the U.S. Environmental Protection Agency to address concerns relating to use of the Megunko Road property for commuter rail facilities. Although the Ashland Station-East is the preferred alternative, environmental issues remain to be resolved. Pending that outcome, an Ashland Station-West alternative also is being evaluated.

The Ashland Station-West alternative would construct north side parking for 200 cars on High Street and south side parking for 500 cars west of the Nyanza site and accessed by a new 4,000 foot long roadway connecting to Route 135. The south side parking would displace nearly 2 acres of wetlands.

The Ashland Station is projected to attract 738 patrons in 1996, with daily ridership increasing to 1,093 by the year 2011.

The traffic analysis revealed that most of the streets and intersections studied in Ashland are currently operating well. The addition of the proposed northerly and southerly commuter rail lots would attract a projected ridership of 837 patrons by the year 2001, while seriously impacting only two signalized intersections south of the railroad on Union Street. The Main Street/Union Street and Union Street/Summer Street intersections would be burdened by the additional traffic during A.M. and P.M.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

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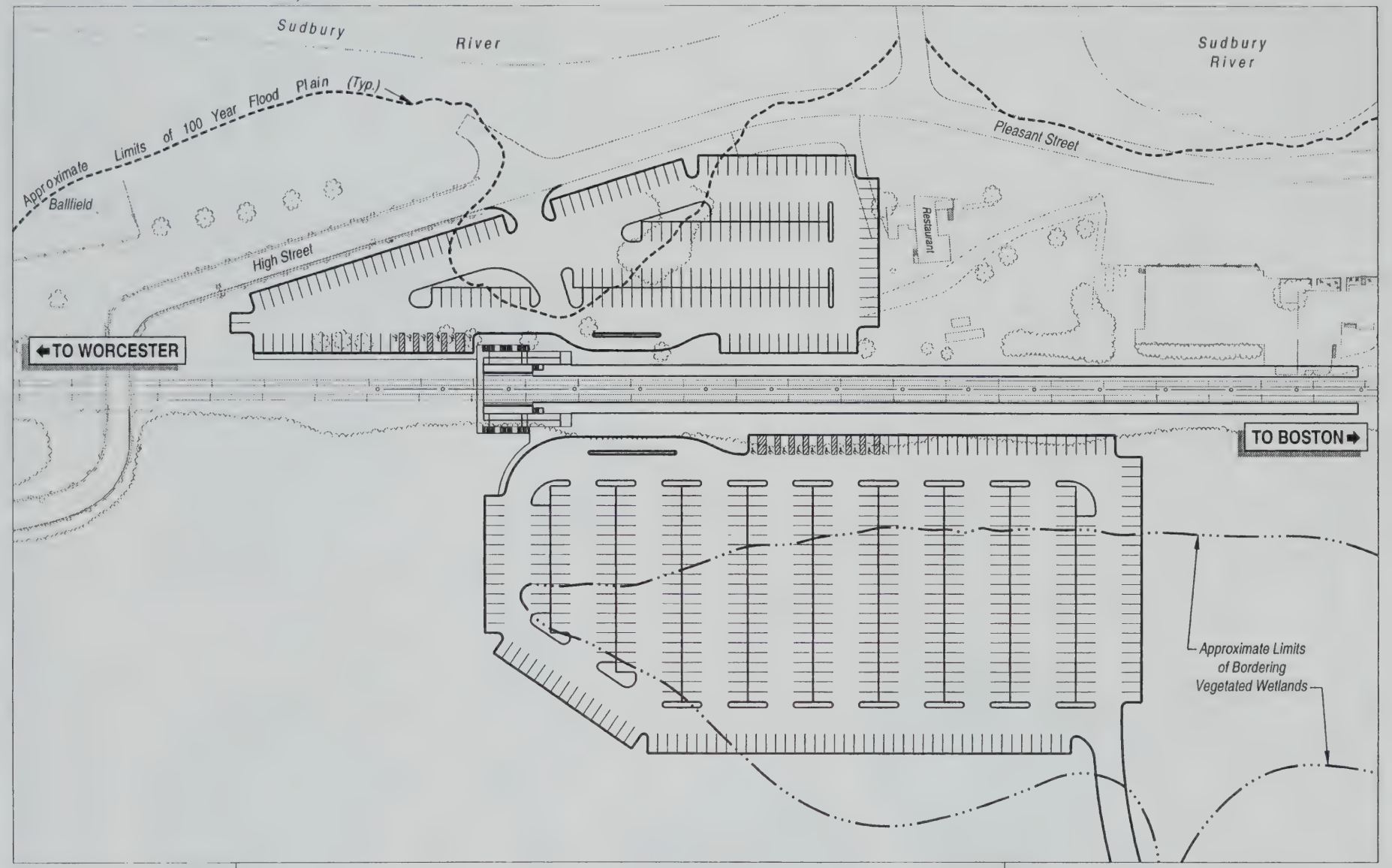
SITE PLAN
ASHLAND EAST ALTERNATIVE

FIGURE 16.0-1



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 125'
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SITE PLAN
ASHLAND WEST ALTERNATIVE

FIGURE 16.0-2

peak hours. Even without the proposed commuter rail station, these two intersections are projected to have serious congestion problems within five years due to normal growth, particularly during morning peak hours. Optimization of the signal timings at these intersections would improve the level of service. Construction of the commuter rail facility will have a positive impact on other routes through Ashland, particularly Route 135, Route 126, Main Street through the center of town, and the Massachusetts Turnpike, by removing a portion of the peak hour traffic on these roads.

For the Ashland Station-East site, a total of 18 residential buildings were found to be within the noise impact distance. Ten of these residential buildings will experience impact from construction vibration. For the Ashland Station West alternative, one restaurant and one commercial building would be impacted by construction noise and vibration.

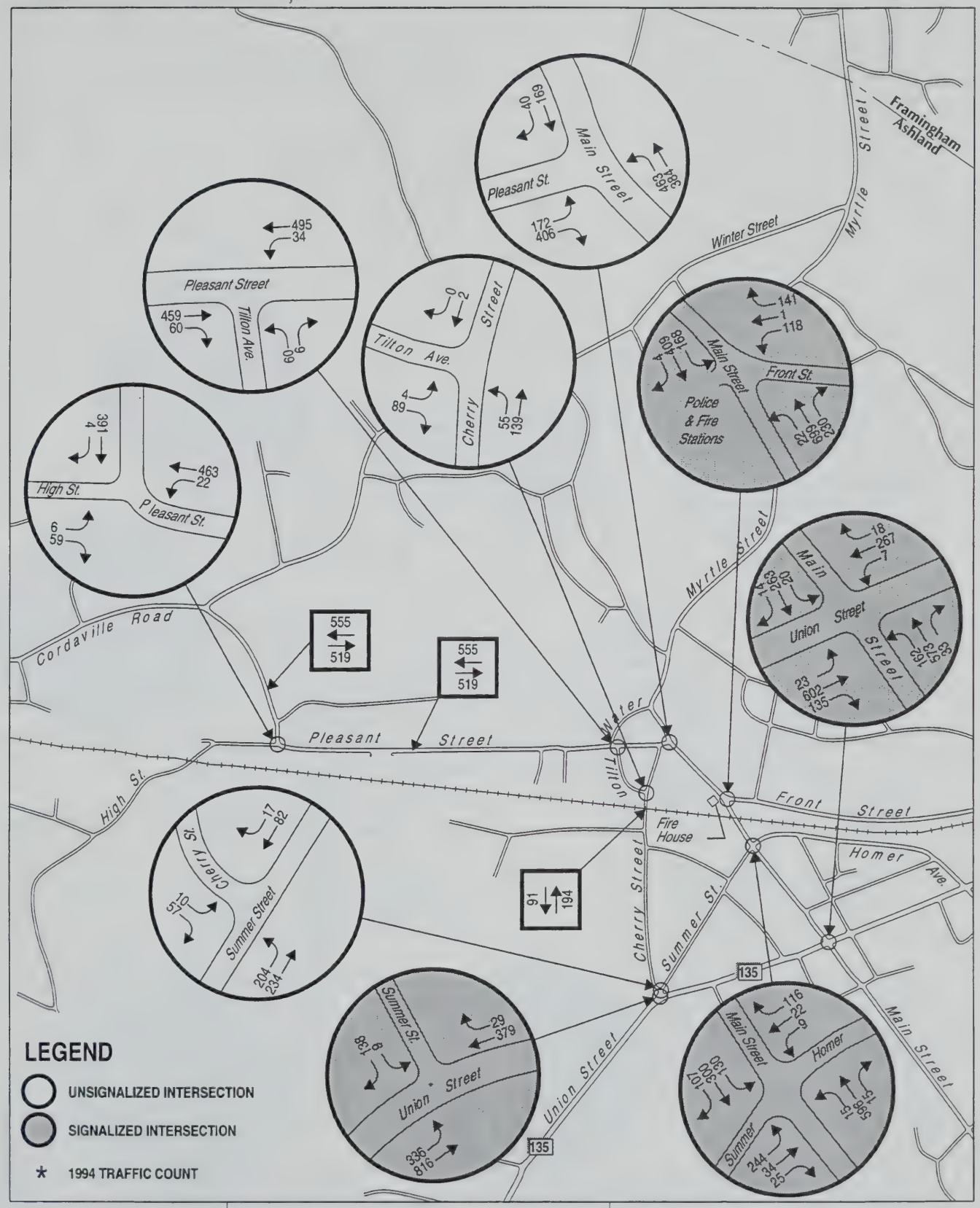
ASHLAND STATION - EAST

16.1 Local Traffic

This section provides a summary of the complete traffic analysis included in Appendix Volume I. This section summarizes existing traffic conditions in Ashland, projected ridership for the Ashland Station and the impact of that ridership on area streets and intersections.

The traffic analysis prepared for the Ashland Station focused on the streets and intersections in the Certificate of the Secretary of Environmental Affairs. Figures 16.1-1 (A.M. Peak Hour) and 16.1-2 (P.M. Peak Hour) show the location of the streets and intersections that were analyzed as part of the study.

Analysis of the streets and intersections was performed for the existing conditions and the "No Build" and "Build" conditions for the years 1996 and 2001. A level of service (LOS) was calculated for each street segment and intersection. A discussion of the LOS rating system is presented in Section 1.3 of this DEIR. A summary of the LOS designations is as follows:



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Approx. Scale: 1" = 1250±

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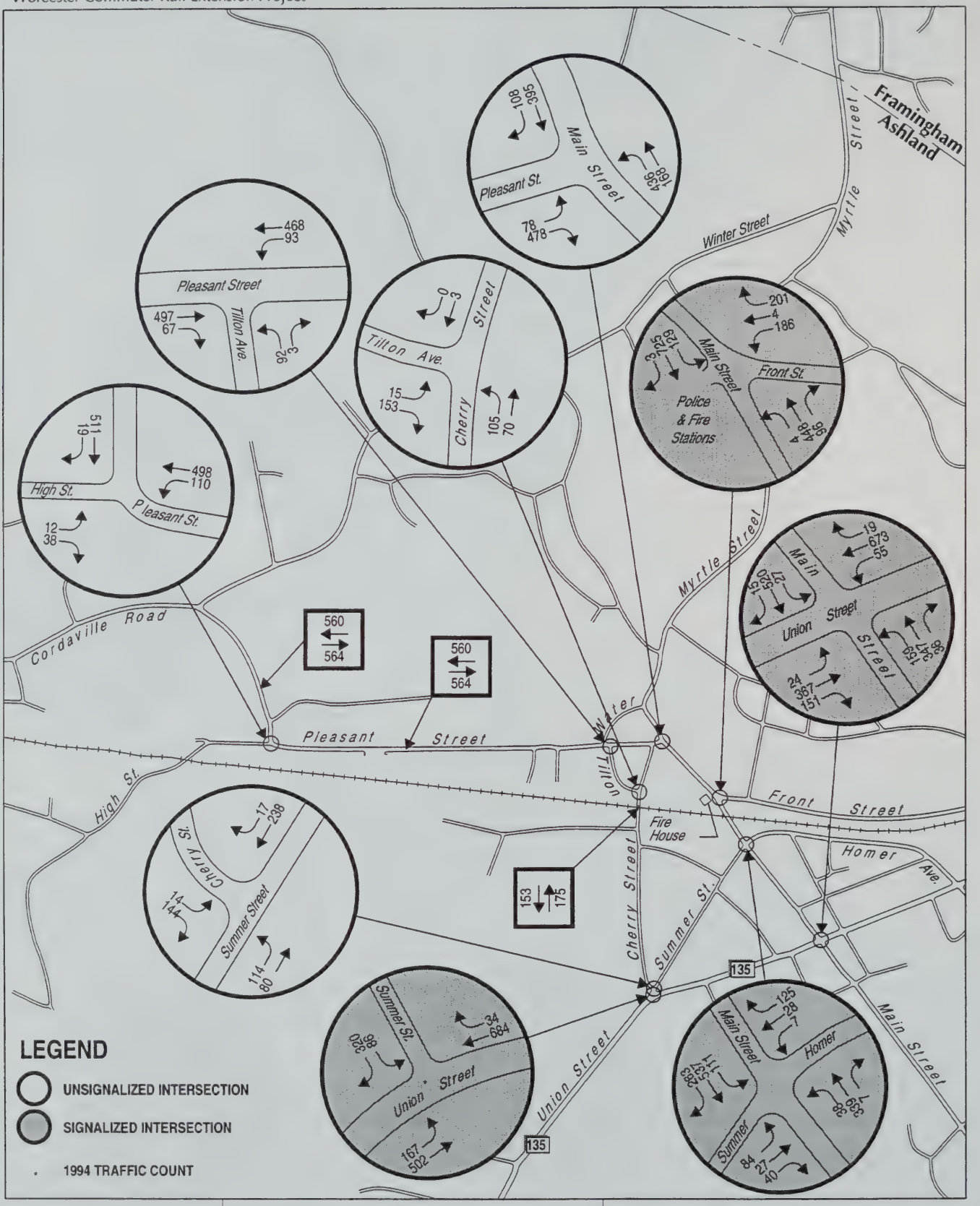
A.M. Peak Hour
7:30 - 8:30 A.M.
1992 Existing Conditions
ASHLAND STATION-EAST

FIGURE 16.1-1



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Approx. Scale: 1" = 1250±

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P.M. Peak Hour
5:00 - 6:00 P.M.
1992 Existing Conditions
ASHLAND STATION-EAST

FIGURE 16.1-2

Rating	Judgment
A	Little or no delay
B	Short traffic delays
C	Average traffic delays
D	Longer than average delays
E	Very long traffic delays
F	Severe congestion, demand exceeds capacity

The results of the LOS analysis are presented for the A.M. and P.M. peak hours as well as the A.M. and P.M. peak generator hours. The A.M. and P.M. peak hours are those periods when traffic conditions are heaviest. The A.M. and P.M. peak generator hours are those periods when usage of the rail station is heaviest. Traffic count data showed that the A.M. and P.M. peak hours in Ashland are from 7:30 to 8:30 A.M. and 5:00 to 6:00 P.M., respectively. The A.M. and P.M. peak generator hours are from 7:15 to 8:15 A.M. and 5:30 to 6:30 P.M., respectively.

Existing Conditions

Existing conditions were determined by traffic counts and intersection turning movement counts conducted from the Fall of 1992 to the Summer of 1994. The results of the counts were used to calculate existing condition levels of service for each of the intersections and street segments studied. Figures 16.1-1 and 16.1-2 show existing A.M. and P.M. peak hour volumes within the study area. Figure 16.1-3 shows existing Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

Table 16.1-1 shows the signalized intersection levels of service and Table 16.1-2 shows the unsignalized intersection levels of service. Roadway segment levels of service are shown in Table 16.1-3.

As Table 16.1-1 indicates, the intersection of Union Street and Summer Street is functioning at LOS F during both the peak hours and the peak generator hours. The three other signalized intersections operate acceptably during the peak hours and peak generator hours, although the Main Street/Union Street intersection is at LOS E in the A.M. peak hour and the A.M. generator hour. As shown, several individual approaches are at LOS F during certain peak periods.

A review of Table 16.1-2 shows that generally the unsignalized intersections are functioning satisfactorily. Only the left turn movement from Pleasant Street to Main Street is operating at LOS F. This occurs in the A.M. peak hour and A.M. peak generator hour. This same movement is at LOS E in the P.M. peak hour and peak

generator hour, while the left turn movement from Pleasant Street to Tilton Avenue is at LOS E in the P.M. peak hour.

Table 16.1-3 shows that all the analyzed road segments are operating acceptably in the peak hours and peak generator hours.

Table 16.1-1 1992 Existing Signalized Intersection Level of Service

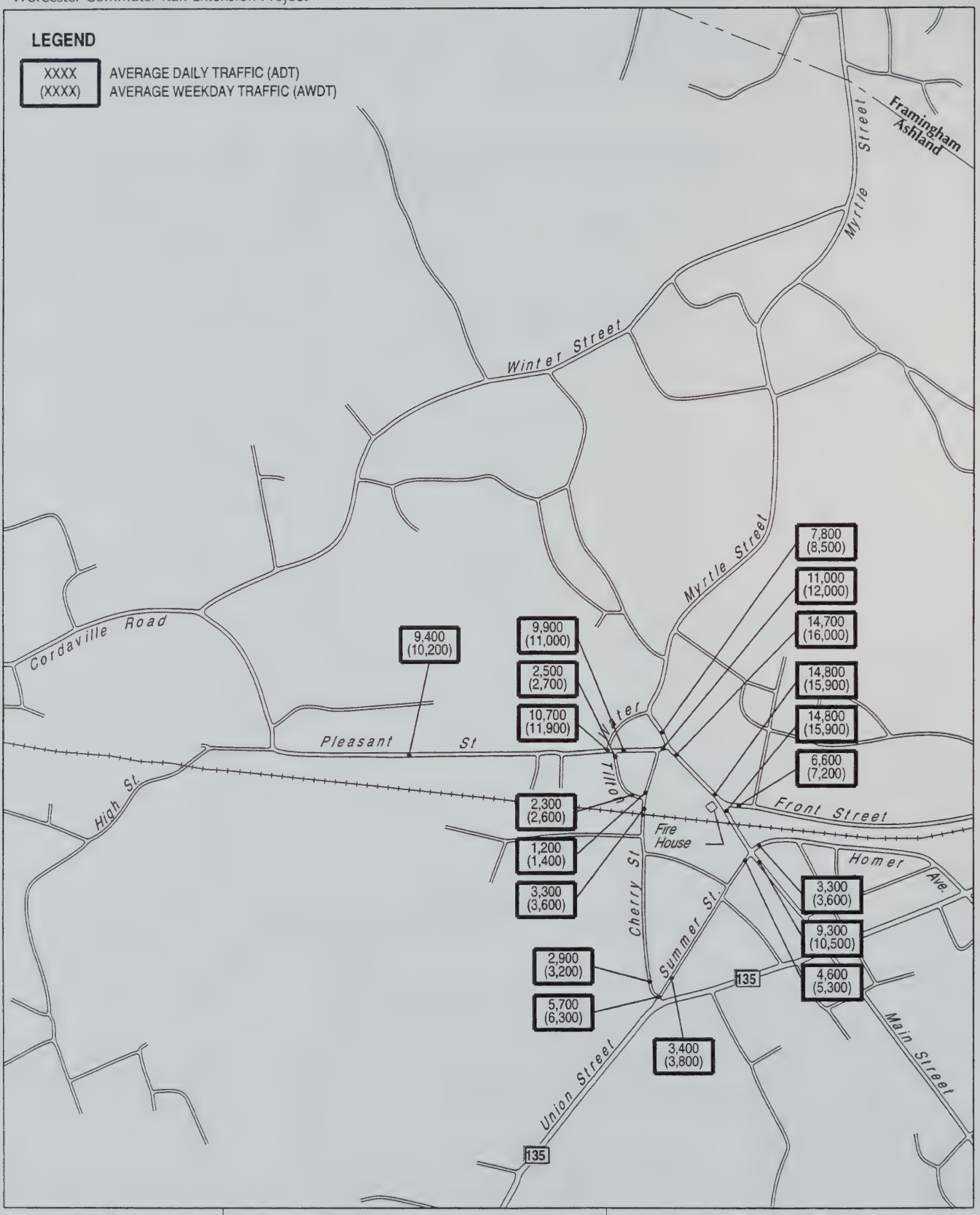
Ashland-East	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Main and Front	D	D	D	C
Westbound	C	D	C	D
Northbound	E	C	E	B
Southbound	B	E	B	D
Main and Summer	D	B	D	B
Eastbound	F	C	F	C
Westbound	C	C	C	C
Northbound	B	B	B	B
Southbound	E	B	D	C
Main with Union	E	D	E	C
Eastbound	F	C	F	C
Westbound	B	E	B	D
Northbound	C	B	C	B
Southbound	B	C	B	B
Union with Summer	F	F	F	F
Eastbound	F	B	F	B
Westbound	F	F	F	F
Southbound	B	F	B	E

Table 16.1-2 1992 Existing Unsignalized Intersection Level of Service

Ashland-East	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	B	D	B	D
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT from Pleasant	D	E	D	D
Main with Pleasant				
LT from NB Main	A	B	A	A
LT from Pleasant	F	E	F	E
RT from Pleasant	A	D	A	C
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from SB Summer	A	B	A	A

Table 16.1-3 1992 Existing Road Segment Level of Service

Ashland-East	Peak Hour		Peak Generator Hour	
	A.M.	P.M.	A.M.	P.M.
Cordaville Road West of Site	E	E	E	D
Pleasant Street East of Site	D	D	D	D
Cherry Street at Railroad Grade Crossing	C	C	C	C



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1250'±

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1992 Average Daily Traffic & 1992 Average Weekday Traffic
ASHLAND, MA

FIGURE 16.1-3

Safety Concerns and Accident History

The Ashland Police Department was contacted on July 28, 1994, to determine the existence and location of any safety concerns or high accident history intersections. According to Lieutenant Doveno, two locations are considered to be possible high frequency accident locations, both involving railroad grade crossings. These are the grade crossing at Main Street and the grade crossing at Cherry Street. Concern was expressed about the possibility of increased traffic on the High Street and Fountain Street bridges due to additional drivers using these roads as alternate routes to avoid delays on Main Street in the center of town.

Rail Ridership Projections

Projections of rail ridership on each of the proposed stations of the Worcester Extension Project were prepared by the Central Transportation Planning Staff (CTPS) in May, 1994. The full CTPS ridership projections memo is included in Appendix Volume II, Section 2.0. CTPS projected that in 1996 the Ashland Station would attract a total of 738 daily round trip commuters. Twenty of these patrons would walk to the station and 59 are projected to be dropped off. The remaining 659 patrons will drive to and park at the station. Based on a vehicle occupancy rate of 1.12, the Park'n'Ride patrons would result in a demand for 589 parking spaces.

The patrons of the Ashland Station are projected to originate from the towns of Ashland, Holliston, Hopkinton, Southborough, and Marlborough. Table 16.1-4 shows the town of origin for the projected Ashland Station riders.

Table 16.1-4 Town of Origin Ashland Station Projected Ridership - Year 1996

TOWN	RIDERS
Ashland	377*
Holliston	279
Hopkinton	47
Southborough	24
Marlborough	11
TOTAL	738

* *Includes 20 walk trips from Ashland*

The impact of the commuter rail riders on area streets as they travel to and from the Ashland Station is determined by assigning those commuters to a particular route in the study area. Riders who live in Ashland would use a variety of travel routes depending on the location of their residence. Commuters from Southborough and

Marlborough would access the northerly site from Cordaville Road. Commuters from Holliston and Hopkinton would get to the southerly station along Route 135 and Main Street. Figure 16.1-4 shows the projected distribution of traffic for the station.

Assignment of Riders to Trains

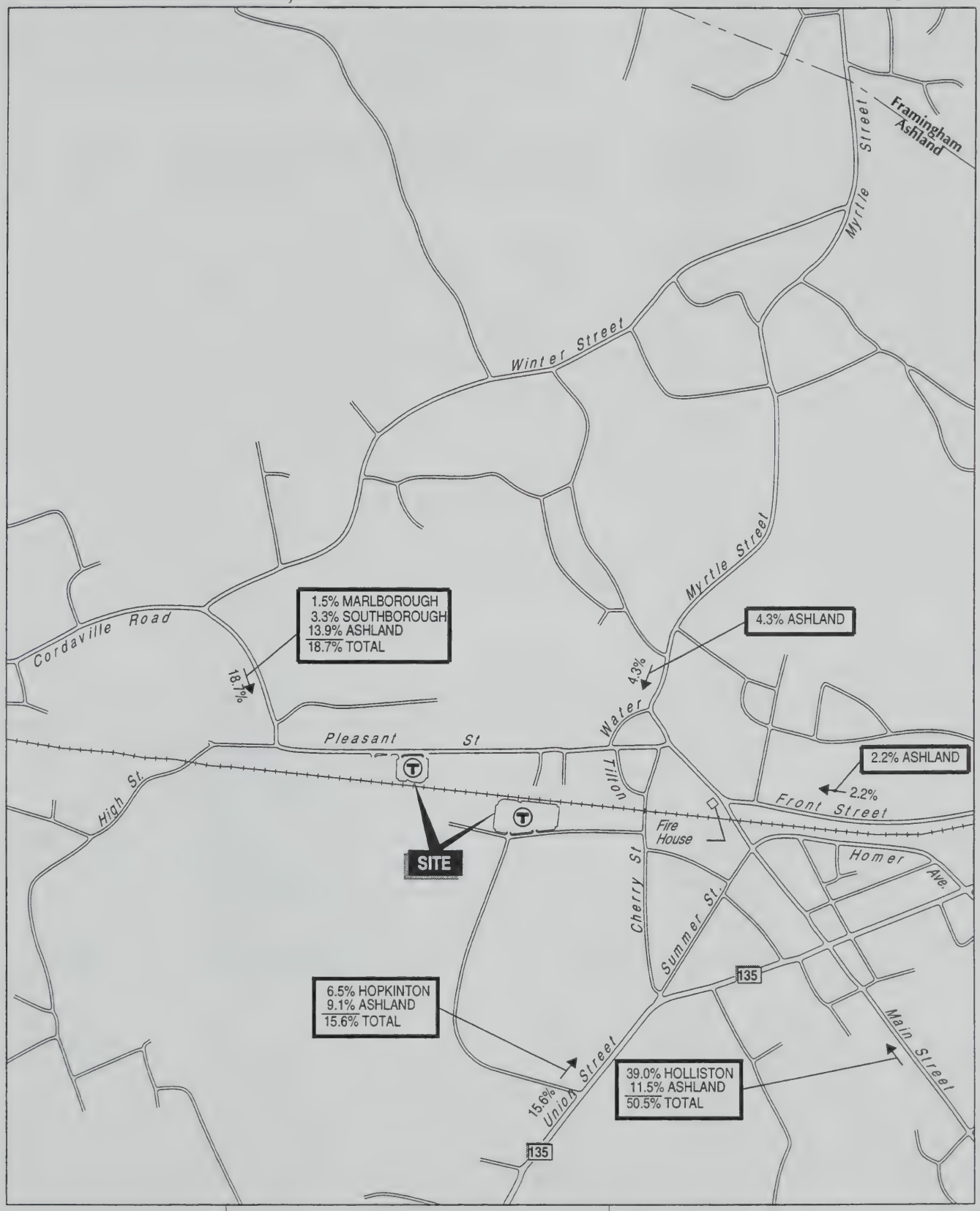
Ashland station patrons would arrive at the station to catch one of four A.M. peak period trains and would leave the station based on the five scheduled P.M. peak period trains. The distribution of riders to each train was determined by use of an equation based on observed arrival and departure data from several MBTA commuter rail lines. The observations of distribution by trains tend to show the greatest number of riders on the trains that arrive at Boston close to 8:30 A.M. Trains arriving earlier and trains getting to Boston after 9:00 A.M. tend to attract fewer riders. In the evening peak, observations show the greater ridership in the middle of what is normally considered the peak commuting period.

1996 Traffic Impacts

The 1996 traffic impacts must also consider background growth of traffic in addition to existing traffic volumes and the new riders destined for the station. Background growth is usually determined by tracking historical growth rates of permanent count locations. During the 1980's, traffic grew at rates of 2 - 3% or more a year in many areas. Data from permanent count locations in the Ashland area showed mixed results including decreases in traffic volumes. As a conservative approach, 0.5% annual growth of traffic volumes was assumed from 1992 to 1996.

The traffic impacts of both a "No Build" and "Build" alternative were analyzed. The 1996 "No Build" alternative allows a comparison with the 1996 traffic impacts of building the commuter rail station. The "Build" alternative did not assume any redistribution of existing traffic on local roads. In other words, the commuters driving to the rail station were considered to be new trips. In actuality, many of those who would drive to the station are already on the road. Their trip will be shortened by driving to the station. In some cases, they are already driving on the same roads to access Route 9, for example, as they would to go to the new station. The "Build" analysis, therefore, does some double counting of vehicles and tends to be a worst case analysis.

The peak hour and peak generator hour overlap by 45 minutes in the A.M. period and 30 minutes in the P.M. peak period. In order to determine the greatest impact to area roadways, both the peak hours and peak generator hours were analyzed.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1250'±

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Distribution of Commuter Rail Station Traffic
1996 BUILD ALL STATIONS
ASHLAND STATION-EAST
FIGURE 16.1-4

Tables 16.1-5 through 16.1-8 present the results of the level of service analysis for the signalized and unsignalized intersections. The tables reflect both the "No Build" and the "Build" conditions.

The intersection of Main Street and Front Street will operate acceptably for all peak periods in the "No Build" and "Build" conditions. The intersection level of service could be improved in the "Build" condition by properly timing the signal to correspond with actual traffic demands. The remaining intersections generally operate poorly in the "No Build" condition, with Main Street/Union Street at LOS F in the A.M. peak hour and peak generator hour and Union Street/Summer Street at LOS F during all peak periods. The level of service at Main Street/Union Street will marginally improve in the "Build" condition to LOS E or better by properly timing the signal. Again, with proper signal timing the Union Street/Summer Street intersection can operate at acceptable levels in the A.M. "Build" condition. During the P.M. peak hour and peak generator hour the intersection will continue to experience failure conditions. The intersection of Main Street and Summer Street will have a minor reduction in level of service in the A.M. generator hour "Build" condition.

A review of Tales 16.1-7 and 16.1-8 shows that for the most part the unsignalized intersections operate at acceptable levels of service under both th 1996 "No Build" and "Build" conditions. As in the existing condition, the left turn movement from Pleasant Street to Main Street is at LOS F. This occurs in both the "No Build" and "Build" conditions for all but the P.M. peak generator hour. Additionally, in the P.M. peak hour and peak generator hour "Build" condition the left turn movement from the proposed southerly station driveway to Union Street will function at LOS F. A minor reduction in level of service will occur in the P.M. generator "Build" condition for traffic turning right from Pleasant Street to Main Street.

Tables 16.1-9 and 16.1-10 show that all of the analyzed road segments will operate acceptably under both the 1996 "No Build" and "Build" conditions.

Table 16.1-5 1996 Signalized Intersection Level of Service - A.M. Peak Hours

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Main with Front	D	B	D	B
Westbound	C	D	C	D
Northbound	E	B	E	B
Southbound	B	A	B	A
Main with Summer	E	E	D	E
Eastbound	F	F	F	F
Westbound	C	C	C	C
Northbound	B	B	B	C
Southbound	F	F	D	E
Main with Union	F	D	F	E
Eastbound	F	D	F	E
Westbound	B	B	B	B
Northbound	C	E	C	E
Southbound	B	B	B	B
Union with Summer	F	D	F	D
Eastbound	F	C	F	D
Westbound	F	D	F	E
Southbound	B	F	B	F

Table 16.1-6 1996 Signalized Intersection Level of Service - P.M. Peak Hours

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hours	
	No Build	Build	No Build	Build
Main with Front	D	C	D	C
Westbound	D	E	D	E
Northbound	C	A	B	A
Southbound	E	C	D	B
Main with Summer	B	B	C	B
Eastbound	C	C	C	D
Westbound	C	C	C	C
Northbound	B	A	B	A
Southbound	B	B	C	B
Main with Union	D	E	C	E
Eastbound	C	E	C	F
Westbound	E	E	D	D
Northbound	B	E	B	E
Southbound	C	C	B	D
Union with Summer	F	F	F	F
Eastbound	B	E	B	E
Westbound	F	F	F	F
Southbound	F	F	E	F

Table 16.1-7 1996 Unsignalized Intersection Level of Service - A.M Peak Hours

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	B	B	B	C
Pleasant with Site's West DW				
LT from WB Pleasant	-	A	-	A
Pleasant with Site East DW				
LT from Parking Lot	-	D	-	D
RT from Parking Lot	-	A	-	A
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT and RT from Tilton	E	E	D	D
Main with Pleasant				
LT from NB Main	A	A	A	A
LT from Pleasant	F	F	F	F
RT from Pleasant	A	A	A	A
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from WB Summer	A	A	A	A
Union with Site's South DW				
LT from EB Union	-	A	-	A
LT from Parking Lot	-	E	-	E
RT from Parking Lot	-	A	-	A

Table 16.1-8 1996 Unsignalized Intersection Level of Service - P.M Peak Hours

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	D	D	D	D
Pleasant with Site's West DW				
LT from WB Pleasant	-	A	-	A
Pleasant with Site East DW				
LT from Parking Lot	-	E	-	D
RT from Parking Lot	-	A	-	A
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT and RT from Tilton	E	E	E	E
Main with Pleasant				
LT from NB Main	B	B	A	A
LT from Pleasant	F	F	E	E
RT from Pleasant	D	D	C	D
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from WB Summer	B	B	A	A
Union with Site's South DW				
LT from EB Union	-	B	-	B
LT from Parking Lot	-	F	-	F
RT from Parking Lot	-	C	-	C

Table 16.1-9 1996 Road Segment Level of Service - A.M Peak Hours

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Cordaville Road West of Site	E	E	E	E
Pleasant Street East of Site	D	D	D	D
Cherry Street at Railroad Crossing	C	C	C	C

Table 16.1-10 1996 Road Segment Level of Service - P.M Peak Hours

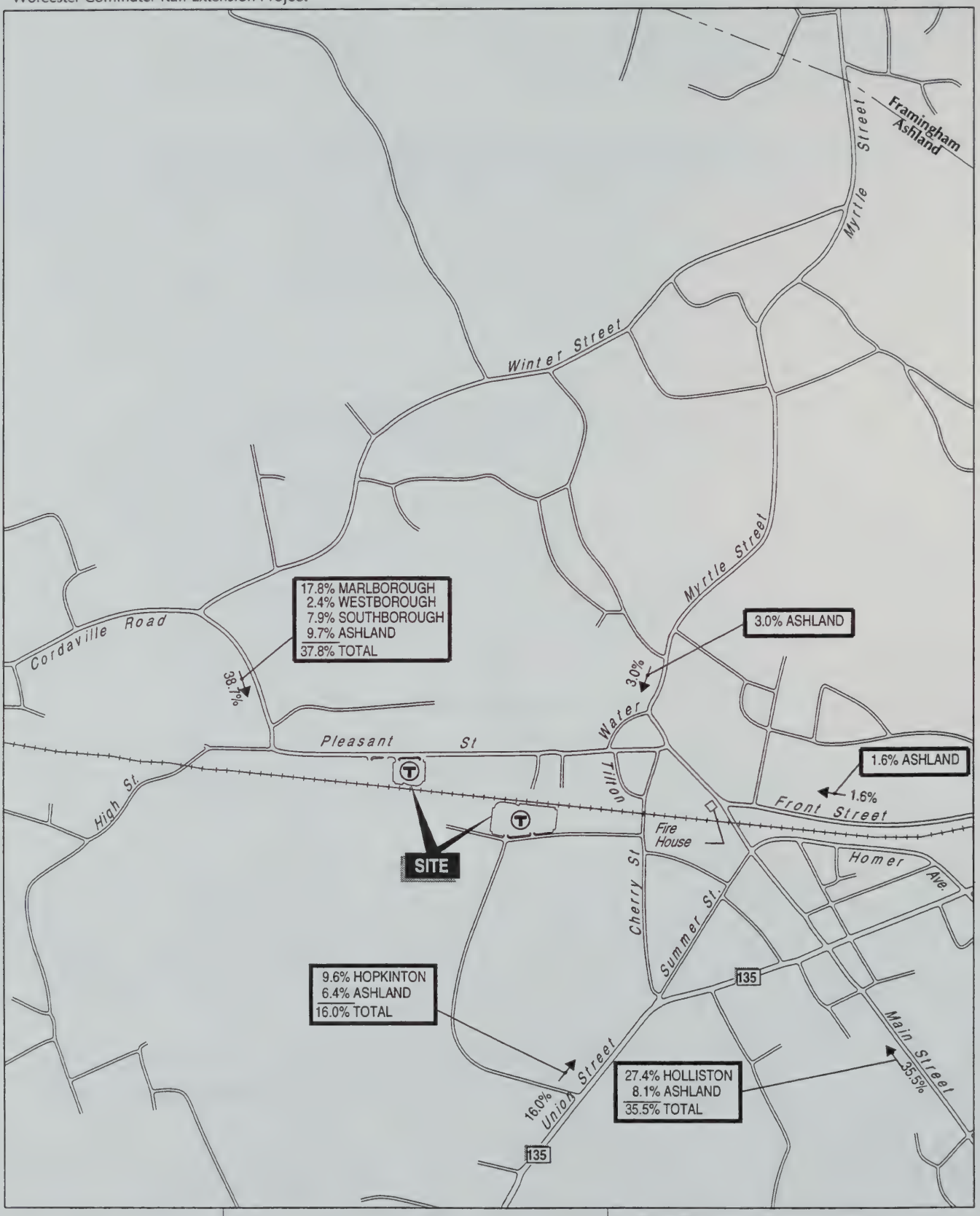
Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Cordaville Road West of Site	E	E	D	E
Pleasant Street East of Site	D	D	D	D
Cherry Street at Railroad Crossing	C	D	C	C

1996 Traffic Impacts - Ashland Station Only

In order to address an upper limit, worst case situation with regard to traffic impacts on Ashland Streets, an analysis was performed which considered that the Ashland commuter station was the only commuter station built by 1996 (in addition to a Worcester Station).

CTPS projected that under this scenario, the Ashland Station would attract 1,041 daily round trip commuters. Twenty of these riders are expected to walk to the station, while 82 would be dropped off at the station. The remaining 939 riders would be Park'n'Ride patrons. Site traffic was distributed over the roadway network in a manner similar to that used for the 1996 "Build All Stations" scenario. The projected traffic distribution is shown in Figure 16.1-5.

A LOS analysis was performed for the peak hour and peak generator hour "Build" condition. The "No Build" condition is the same as previously presented for the "Build All Stations" scenario.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 1250'±

0 1250

Distribution of Commuter Rail Station Traffic
1996 BUILD Ashland Only
ASHLAND STATION - EAST

FIGURE 16.1-5

Tables 16.1-11 through 16.1-14 list the levels of service for the signalized and unsignalized intersections in both the "No Build" and "Build" conditions.

Under both the "No Build" and "Build" conditions, the Main Street/Front Street and the Main Street/Summer Street intersections will operate satisfactorily. Level of service at the Main Street/Front Street intersection is shown to improve in the "Build" condition due to optimization of the traffic signal timing. The Main Street/Summer Street intersection will experience a small reduction in level of service in the A.M. generator hour "Build" condition. The Main Street/Union Street intersection is at LOS F in both A.M. peak periods in the "No Build" condition. With proper signal timing the level of service at this location can be marginally improved in the "Build" condition. The Union Street/Summer Street intersection is at failure conditions during all peak periods in the "No Build" condition. The intersection will continue to function at LOS F in the "Build" P.M. peak periods, although minor reductions in overall vehicle delay can be realized by optimizing the signal timing.

The unsignalized intersections (Tables 16.1-13 and 16.1-14) generally function at acceptable levels under both "No Build" and "Build" conditions. Some movements will experience minor reductions in level of service in the "Build" condition. As in the existing condition, the left turn movement from Pleasant Street to Main Street is at LOS F for most of the "No Build" peak periods. This movement continues to function at LOS F in the "Build" A.M. peak periods. Additionally, the left turn movement from both the northerly site driveway and the southerly site driveway is a LOS F in the P.M. peak periods.

Tables 16.1-15 and 16.1-16 show that the road segments function acceptably under both the "No Build" and the "Build" conditions.

Table 16.1-11 1996 Signalized Intersection Levels of Service - A.M Peak Hours (Ashland Station Only)

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Main with Front	D	B	D	B
Westbound	C	D	C	D
Northbound	E	B	E	B
Southbound	B	A	B	A
Main with Summer	E	E	D	E
Eastbound	F	F	F	F
Westbound	C	C	C	C
Northbound	B	B	B	C
Southbound	F	F	D	E
Main with Union	F	D	F	E
Eastbound	F	D	F	E
Westbound	B	B	B	B
Northbound	C	E	C	E
Southbound	B	B	B	B
Union with Summer	F	D	F	D
Eastbound	F	C	F	D
Westbound	F	D	F	E
Southbound	B	F	B	F

Table 16.1-12 1996 Signalized Intersection Levels of Service - P.M Peak Hours (Ashland Station Only)

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hours	
	No Build	Build	No Build	Build
Main with Front	D	C	D	C
Westbound	D	F	D	E
Northbound	C	A	B	A
Southbound	E	C	D	B
Main with Summer	B	B	C	B
Eastbound	C	C	C	D
Westbound	C	C	C	C
Northbound	B	A	B	A
Southbound	B	B	C	B
Main with Union	D	E	C	E
Eastbound	C	E	C	F
Westbound	E	E	D	D
Northbound	B	E	B	E
Southbound	C	C	B	D
Union with Summer	F	F	F	F
Eastbound	B	E	B	E
Westbound	F	F	F	F
Southbound	F	F	E	F

Table 16.1-13 1996 Unsignalized Intersection Level of Service - A.M Peak Hours (Ashland Station Only)

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	B	C	B	C
Pleasant with Site's West DW				
LT from WB Pleasant	-	A	-	A
Pleasant with Site East DW				
LT from Parking Lot	-	D	-	D
RT from Parking Lot	-	A	-	A
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT and RT from Tilton	E	E	D	D
Main with Pleasant				
LT from NB Main	A	A	A	A
LT from Pleasant	F	F	F	F
RT from Pleasant	A	A	A	A
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from WB Summer	A	A	A	A
Union with Site's South DW				
LT from EB Union	-	A	-	A
LT from Parking Lot	-	E	-	E
RT from Parking Lot	-	A	-	A

Table 16.1-14 1996 Unsignalized Intersection Level of Service - P.M Peak Hours (Ashland Station Only)

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	D	D	D	D
Pleasant with Site's West DW				
LT from WB Pleasant	-	A	-	A
Pleasant with Site East DW				
LT from Parking Lot	-	F	-	E
RT from Parking Lot	-	A	-	A
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT and RT from Tilton	E	E	E	E
Main with Pleasant				
LT from NB Main	B	B	A	A
LT from Pleasant	F	F	E	E
RT from Pleasant	D	D	C	D
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from WB Summer	B	B	A	A
Union with Site's South DW				
LT from EB Union	-	B	-	B
LT from Parking Lot	-	F	-	F
RT from Parking Lot	-	D	-	C

Table 16.1-15 1996 Road Segment Level of Service - A.M Peak Hours (Ashland Station Only)

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Cordaville Road West of Site	E	E	E	E
Pleasant Street East of Site	D	D	D	D
Cherry Street at Railroad Grade Crossing	C	C	C	D

Table 16.1-16 1996 Road Segment Level of Service - P.M Peak Hours (Ashland Station Only)

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Cordaville Road West of Site	E	E	D	E
Pleasant Street East of Site	D	D	D	D
Cherry Street at Railroad Grade Crossing	C	C	C	C

2001 Traffic Impacts

The level of service analysis for the Ashland Study area is again presented for the year 2001 "No Build" and "Build" conditions. To account for normal background traffic growth, an annual growth factor of 1.5% was applied to the 1996 traffic volumes to develop 2001 "No Build" volumes. Proposed ridership projections were used to develop the "Build" condition volumes.

CTPS projected that in the year 2001, the Ashland Station is expected to attract 837 daily round trip commuters. Twenty of these patrons are expected to walk to the station while 65 would be dropped off at the station. The remaining 752 riders would be Park'n'Ride patrons. Projected traffic distribution is essentially the same as shown in Figure 16.1-4.

A LOS analysis was conducted for the "No Build" and "Build" condition in both the peak hours and peak generator hours.

Tables 16.1-17 though 16.1-20 present the results of the analysis for the signalized and unsignalized intersections.

As in the previous analyses, the Main Street/Front Street intersection, while operating satisfactorily in the "No Build" condition, can be improved in the "Build" condition by proper timing. Under the "No Build" condition in the A.M. peak periods, the remaining signalized intersections deteriorate to LOS F due to normal background traffic growth. In the "Build" condition A.M. peak periods, minor improvements in level of service at the Main Street/Union Street and Union Street/Summer Street intersections can be realized with optimized signal timing. The Main Street/Summer Street intersection will continue to function at LOS F in the A.M. "Build" condition. The Main Street/Union Street intersection will deteriorate to LOS F in the P.M. peak period "Build" condition, while Union Street/Summer Street will operate at LOS F in both the "No Build" and "Build" P.M. peak periods.

The unsignalized intersections shown in Tables 16.1-19 and 16.1-20 generally operate at acceptable levels in both the "No Build" and "Build" conditions. Several movements will experience some reduction in level of service in the "Build" condition. As in the 1996 analysis, the left turn movement from Pleasant Street to Main Street is at or near failure under both "No Build" and "Build" conditions, as is the left turn from the southerly site driveway to Union Street. Also, the turning movement from Tilton Avenue to Pleasant Street operates at LOS F in the P.M. peak hour "No Build" and "Build" condition.

As shown in Tables 16.1-21 and 16.1-22 the road segments will be at acceptable levels of service in all peak periods under both the "No Build" and "Build" conditions.

Table 16.1-17 2001 Signalized Intersection Levels of Service - A.M Peak Hours

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Main with Front	E	B	E	B
Westbound	C	D	C	D
Northbound	F	B	F	B
Southbound	B	A	B	A
Main with Summer	F	F	F	F
Eastbound	F	F	F	F
Westbound	C	C	C	C
Northbound	C	C	C	C
Southbound	F	F	F	F
Main with Union	F	E	F	F
Eastbound	F	F	F	F
Westbound	B	B	B	B
Northbound	C	F	C	F
Southbound	B	C	B	C
Union with Summer	F	D	F	E
Eastbound	F	C	F	D
Westbound	F	E	F	F
Southbound	B	F	B	F

Table 16.1-18 2001 Signalized Intersection Levels of Service - P.M Peak Hours

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Main with Front	E	D	D	C
Westbound	D	F	D	F
Northbound	C	B	C	A
Southbound	F	D	E	C
Main with Summer	C	B	D	B
Eastbound	C	D	C	D
Westbound	C	C	C	C
Northbound	B	A	B	A
Southbound	C	B	D	B
Main with Union	E	F	D	F
Eastbound	D	F	C	F
Westbound	F	F	E	F
Northbound	D	F	C	F
Southbound	C	C	C	D
Union with Summer	F	F	F	F
Eastbound	B	F	B	F
Westbound	F	F	F	F
Southbound	F	F	F	F

Table 16.1-19 2001 Unsignalized Intersection Level of Service - A.M Peak Hours

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	B	C	B	C
Pleasant with Site's West DW				
LT from WB Pleasant	-	A	-	A
Pleasant with Site East DW				
LT from Parking Lot	-	D	-	D
RT from Parking Lot	-	A	-	A
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT and RT from Tilton	E	E	D	E
Main with Pleasant				
LT from NB Main	A	A	A	A
LT from Pleasant	F	F	F	F
RT from Pleasant	B	B	A	A
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from WB Summer	A	A	A	A
Union with Site's South DW				
LT from EB Union	-	A	-	A
LT from Parking Lot	-	E	-	E
RT from Parking Lot	-	A	-	A

Table 16.1-20 2001 Unsignalized Intersection Level of Service - P.M Peak Hours

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Pleasant with High				
LT from WB Pleasant	A	A	A	A
LT and RT from High	D	D	D	D
Pleasant with Site's West DW				
LT from WB Pleasant	-	A	-	A
Pleasant with Site East DW				
LT from Parking Lot	-	E	-	E
RT from Parking Lot	-	A	-	A
Pleasant with Tilton				
LT from WB Pleasant	A	A	A	A
LT and RT from Tilton	F	F	E	E
Main with Pleasant				
LT from NB Main	C	C	B	B
LT from Pleasant	F	F	E	E
RT from Pleasant	E	E	D	D
Cherry with Tilton				
LT from NB Cherry	A	A	A	A
LT and RT from Tilton	A	A	A	A
Summer with Cherry				
LT from EB Summer	A	A	A	A
LT and RT from SB Cherry	A	A	A	A
THRU and RT from WB Summer	B	C	B	B
Union with Site's South DW				
LT from EB Union	-	B	-	B
LT from Parking Lot	-	F	-	F
RT from Parking Lot	-	D	-	C

Table 16.1-21 2001 Road Segment Level of Service - A.M Peak Hours

Ashland-East	A.M. Peak Hour		A.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Cordaville Road West of Site	E	E	E	E
Pleasant Street East of Site	E	E	D	D
Cherry Street at Railroad Grade Crossing	C	D	C	D

Table 16.1-22 2001 Road Segment Level of Service - P.M Peak Hours

Ashland-East	P.M. Peak Hour		P.M. Peak Generator Hour	
	No Build	Build	No Build	Build
Cordaville Road West of Site	E	E	E	E
Pleasant Street East of Site	E	E	D	D
Cherry Street at Railroad Grade Crossing	C	D	C	D

Summary of Findings

The basic findings of the traffic analysis were that most of the streets and intersections studied in Ashland are currently operating well. The addition of the proposed northerly and south commuter rail lots would attract a projected ridership of 837 patrons by the year 2001, while seriously impacting only two of the Town's intersections. These two signalized intersections lie south of the rail tracks on Union Street. The Main Street/Union Street and Union Street/Summer Street intersections would be burdened by the additional traffic during A.M. and P.M. peak hours. It should be noted that even without the proposed commuter rail station in place, these two intersections are projected to have serious congestion problems due to normal growth within five years, particularly during morning peak hours. Optimization of the signal timings at these intersections may realize an improvement for their level of service ratings. It should also be noted that construction of the commuter rail facility will have a positive impact on other routes throughout Ashland, particularly Route 135, Route 126, Main Street through the center of town, and the Massachusetts Turnpike, by removing a portion of their peak hour traffic.

16.2 Air Quality

Employing the rationale and methodology described for the Millbury Route 122 Station analysis, the intersection of Main Street and Union Street (Route 135) was selected for the analysis (see Figure 16.1-1). Consideration was given for the Union Street/Summer Street/Cherry Street intersection, but sensitive receptors were lacking. The Main Street intersection with Summer and Homer Streets did not qualify since station generated traffic does not add to the existing condition. Optimization of the signal timing was employed for the Main/Union intersection under the "Build" condition.

In order to simulate the highest CO concentrations, receptor locations were established along the sidewalk areas nearest to the traffic lanes. The offsets are 24 feet from the center of both Main Street and Union Street. The results for the year 1996 are as follows in Table 16.2-1.

Table 16.2-1 1996 CO Concentrations - Main Street/Union Street Intersection

	1-Hour CO (ppm)		8-Hour CO (ppm)	
	No Build	Build	No Build	Build
Northwest Sidewalk	6.4	6.9	4.5	4.8
Northeast Sidewalk	7.0	7.6	4.9	5.3
Southeast Sidewalk	7.2	7.6	5.0	5.3
Southwest Sidewalk	6.5	6.8	4.6	4.8

Although the predicted CO concentrations are slightly higher for the "Build" versus the "No Build" condition, all values are well below the 35 ppm for the 1-hour standard and 9 ppm for the 8-hour standard. Additional receptors evaluated included the funeral home on the northwest corner, the New England Telephone office on the northeast corner, the real estate office on the southeast and a 2-family and single-family dwelling on the southwest. The predicted CO concentrations for the 1-hour case range from 4.7 ppm for the "No Build" to 6.1 ppm for the "Build" condition. Similarly, the 8-hour values range from 3.3 ppm to 4.3 ppm. The maximum increase for the "Build" condition is only 0.4 ppm.

16.3 Noise and Vibration

Noise Impact Analysis Methodology

Because of slow train speeds near stations, the potential for noise and vibration impacts from train operations are at a minimum compared to other segments of the right-of-way. There is, however, the potential of effects on the noise and vibration environment in the vicinity of the station because of project-induced traffic on roads leading to and from station areas, as well as short-term effects during construction of platforms, parking and other site facilities.

Traffic Noise

The significance of noise impacts from project-generated traffic near proposed commuter rail stations along the corridor was assessed based on the projected noise increase relative to the noise from existing traffic on applicable roads. Because the greatest changes in traffic volumes are expected to occur during peak commuting periods, the noise increase was evaluated in terms of the peak-hour L_{eq}.

Criteria for traffic noise impact are based on existing FTA guidelines, and state that a noise level increase of greater than 5 dBA is considered to represent impact. The existing FTA criteria are used here rather than the proposed FTA criteria used in the train noise assessment because of the general, non-site specific nature of the traffic noise impact assessment. Where the existing layout of major roads will essentially remain the same, the traffic noise assessment predicts only the change in noise resulting from the projected change in traffic volumes near the stations, and not the absolute traffic noise levels at specific noise-sensitive locations in the community.

The traffic noise analysis was carried out on a relative basis, by estimating the change in peak-hour traffic noise, which is a function of the change in peak-hour traffic volume. The assumption is that all other non-project related noise sources remain unchanged.

Construction Noise and Vibration

The construction of a fixed facility such as a commuter rail station is expected to include clearing, excavation, foundation work, equipment installation, paving and finishing. Construction machinery is likely to include the types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes and trucks. Construction will typically occur during 8 to 10 hour weekday, daytime periods.

Construction of the station can be categorized in two distinct operations—parking lots and platform areas—with total duration of construction estimated to be approximately eight months.

For a typical station site, the distance to significant noise impact was estimated to be 200 feet measured from the closest area of construction. In cases where noise-sensitive land uses were concentrated in a location very close to either the platform area or the parking area, separate screening distances were used to assess the two construction scenarios.

Station construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Usage factors were assigned to each piece of equipment to determine a cumulative reference noise level to use in determining the width of the noise impact zone.

Noise impact criteria for construction are based on the outdoor Annual Average Day-Night Equivalent Sound Level (AA L_{dn}), with a threshold of 65 AA L_{dn} defining the impact zone. This metric is slightly less conservative than the 24-hour L_{dn} used for train noise impact, given the short-term nature of construction noise impact. (A complete definition of metrics and terms pertaining to noise and vibration used in this report are given in Appendix, Volume II, Section 3.0).

The impact criteria for construction vibration are essentially the same as for train operations, except that impact is assessed only when the activity will occur for 30 days or more at a given location. Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990) . Vibration projections were made for the main equipment categories, based on the relative amount of energy imparted to the ground. Details on this methodology are given in Appendix 3.0. A screening distance of 85 ft measured from nearest area of construction was estimated for vibration impact from general construction activity at stations.

Traffic Noise Impacts

Pleasant Street, which runs along the northern boundary of the station, would be the major road most affected by passenger traffic destined for the parking lot north of the railroad. Here there are residences situated typically 40 to 50 ft north of the centerline of Pleasant Street. The peak-hour L_{eq}, however, is projected to increase by less than 1 dBA, due to traffic volume increasing by a factor of only about 1.03. In order to generate a 5 dBA increase, this factor must be at least 3 (i.e. a tripling of peak-hour volume). Therefore, no noise impact is projected for residences on Pleasant Street in the vicinity of the proposed station site.

Traffic destined for the parking lot south of the tracks would result in volume increasing by a factor of 1.2 during the P.M. peak hour along Union Street between Sumner Street and the parking lot driveway, and a slightly lesser increase south of the driveway. The peak hour L_{eq} would increase by less than 1 dBA, therefore, no traffic noise impact would occur due to station generated traffic.

The new two lane 3,000 foot long access drive into the south side parking lot will traverse vacant and/or industrial lands and no significant traffic noise impact is anticipated.

Construction Noise and Vibration Impacts

For the Ashland Station-East site, a total of 18 residential buildings were found to be within the noise impact distance. These receptors will be exposed to noise levels of 65 to 67 dBA, AA L_{dn}. Ten of these residential buildings will experience impact from construction vibration.

Traffic Noise Mitigation

No significant traffic noise impact was identified for the Ashland Station-East site.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures can be implemented:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers, and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

During the project design phase, specific construction noise limits will be developed and incorporated into the contract specifications, along with requirements for noise monitoring to certify compliance with the specified limits.

All of the potential vibration impacts from construction identified are related to annoyance effects and not to building damage effects, and will occur only during daytime hours. Following are some procedures that can be used to minimize the potential for annoyance from construction vibration:

- Restrict procedures that contractors can use in vibration-sensitive areas, and specify alternative techniques that generate lower vibration levels.
- Restrict the hours of vibration-intensive activities and the use of heavy-duty equipment to weekdays during daytime hours.
- Require vibration monitoring during vibration-intensive activities, especially blasting.

16.4 Site Drainage

The proposed Ashland Station East alternative lies within the Sudbury River watershed. Existing land uses include a currently undeveloped two-acre parcel along Pleasant Street north of the tracks and light industrial land along Megunko Road south of the tracks. Existing subsurface soil conditions in these areas are classified as "somewhat excessively drained" soils on glacial outwash plains. The proposed site plan for these areas is shown in Figure 16.0-1.

The north side site consists of sparsely vegetated areas with irregular topography. Portions of this site drain in a northeasterly direction to Pleasant Street or in a southeasterly direction to a series of swales running parallel to the railroad tracks, and runoff from the remaining portion is retained on site. Given the sandy soil conditions and irregular topography at this site, it is assumed that a fair amount of stormwater infiltration occurs.

The south side site consists of older one and two story industrial buildings, paved and unpaved parking, loading and vehicle storage areas. Little vegetation exists. The site slopes generally in a northeasterly direction and drains into Chemical Brook. The brook flows to a 36" culvert, crosses under the railroad tracks into a closed drainage system and ultimately discharges into the Sudbury River.

The proposed station will consist of approximately 700 paved parking spaces (200 spaces north and 500 spaces south of the tracks), sidewalks, platforms, ramps, stairs, a pedestrian overpass, landscaping and associated drainage systems. A new 3,000 foot long roadway is proposed as part of this project to access the south side parking area. A separate drainage system for the roadway will be designed in accordance with Ashland subdivision rules and regulations.

Best Management Practices (BMPs) will be implemented in the station design. The goal of the BMPs will be to prevent flooding and soil erosion onto adjacent

properties, and minimize stormwater runoff impacts to the Sudbury River. The BMPs proposed include implementation of a parking lot sweeping program, erosion control features and a stormwater management plan consisting of detention areas, recharge systems and catch basins equipped with sumps and oil and grease traps. Catch basin sumps are very effective in removing larger sized sediments with associated contaminants, from parking lot runoff.

General maintenance of the station will include the implementation of a regular parking lot sweeping program. One objective of a sweeping maintenance program is to remove as many contaminants as possible from the parking lot surfaces before they are washed into the stormwater collection system. Studies have determined that a large percentage of contaminant loads are bound to particulates (silt and sand particles) and thus a regular sweeping program will be effective in reducing pollutant loadings and improving runoff water quality. Cleaning of catch basins will remove additional sediment and large debris from the stormdrain system.

General maintenance also will include the removal of trash and organic debris (leaves and fallen branches). This will not only reduce loadings of nutrient related contaminants, but will keep the stormwater collection/management system clear and working properly.

The site does not lie within any flood plain area as indicated in the Flood Insurance Rate Map (FIRM) for the Town of Ashland, community panel number 2501790001 dated July 16, 1981. Localized flooding will be prevented by maintaining or reducing the peak flows to the pre-construction rates. The existing and proposed peak rates of runoff are presented specific to the northerly and southerly lots.

Stormwater runoff from the north side parking lot will be directed to a proposed subsurface detention/recharge system. The system will consist of several interconnected perforated polyethylene pipes surrounded by crushed stone and lined with filter fabric. The system will be designed to recharge all stormwater runoff from low flow storm (up to a one inch rainfall), and to detain and discharge all stormwater from larger storms in excess of a one inch rainfall. The discharge pipe will be designed such that there will be no increase in the peak rate of stormwater runoff leaving the site.

Stormwater runoff from the south side parking lot will be routed through a proposed stormwater detention basin. The basin will be graded with relatively gradual sideslopes (3 horizontal to 1 vertical), and the bottom will be vegetated and be normally dry. The basin will be sized to contain stormwater flows from storms up to and including the 100 year event. An outlet control structure will be designed to

release the detained stormwater at a peak flow rate which will not exceed existing conditions during the 10 and 100 year storm events.

The existing and proposed peak rates of runoff are presented in Tables 16.4-1 and 16.4-2. The watershed mapping, TR-55 analysis and computer generated hydrographs are included in Appendix Volume II, Section 5.

Table 16.4-1 Peak Rates of Runoff North Side, Ashland Station-East

Storm Event	Existing Conditions	Proposed Conditions
10 Year	2.0 cfs	1.7 cfs
100 Year	4.8 cfs	3.5 cfs

Table 16.4-2 Peak Rates of Runoff South Side, Ashland Station-East

Storm Event	Existing Conditions	Proposed Conditions
10 Year	15.0 cfs	13.0 cfs
100 Year	24.7 cfs	18.7 cfs

Water Supply

The Town's public groundwater wells are located off Howe Street approximately three miles south of the Howe Street bridge. Town Well #3 is an abandoned water supply well near the railroad on High Street. According to the Ashland Water Department, the Town does not have any plans to bring the well back on line. The Board of Health has been consulted regarding private wells in the area. There are some private wells on Howe Street approximately 500-600 feet north of the railroad. Stormwater management for the station parking lot as discussed above would not direct runoff toward these wells.

16.5 Wetlands and Wildlife

Wetlands within the vicinity of the various station site alternatives in Ashland include a Red Maple swamp, Chemical Brook and a retention/wetland replication area on the Nyanza Site. The Sudbury River is to the north of the sites.

The wetland restoration/replication area on the Nyanza site was developed as part of the Superfund Remediation efforts and would not be affected by any of the station site alternatives proposed for Ashland.

Part of the platform/ramp structure for the East Alternative would impact approximately 100 linear feet of the ditch referred to as Chemical Brook. Chemical Brook runs adjacent to the south side of the railroad embankment. The contaminated sediments in the brook bed were removed during the first phase of the Nyanza Site cleanup operation but contaminated soils remain below the groundwater level. The ditch would most likely be carried in a culvert adjacent to the platform footing.

The brook has been channelized with sloped ballast banks and is approximately 3 to 5 feet wide. It supports herbaceous plants such as purple loosestrife that frequently overtake disturbed areas. The ballast banks and industrial setting provide minimal if any wildlife value for the ditch and banks. Construction of the platform for the station may encounter contaminated soils in this area. Coordination is being carried out with agencies involved with the Nyanza Superfund Site regarding issues associated with the station and the Nyanza site. Additional discussion regarding the Nyanza site can be found in Sections 16.9.

16.6 Historic Properties and Sites

A survey of the Ashland Station-East site was completed. The site is within an area of wood-frame residential structures built from the mid-nineteenth century through the beginning of the twentieth century. These are all located on the north side of the rail line. South of the line are mid-to-late nineteenth-century industrial structures. Approximately 30 architectural inventory forms will be completed for this site. It is anticipated that impacts on any potential National Register properties will be primarily visual. See Section 7.8 for a description of Ashland's potentially historic properties.

16.7 Archaeological Resources

The archaeological reconnaissance survey that the MBTA undertook as part of the EIR process included the location of the Ashland Station East site. The proposed Ashland station falls near the location of a recorded prehistoric site, and the station area also may contain historic-period archaeological sites of the nineteenth century or slightly earlier. However, construction of the railroad bed and associated building in the nineteenth and early twentieth centuries and more recent commercial and industrial

development have disturbed the proposed station area extensively. The extent and depth of existing disturbance will be assessed as part of the archaeological impact mitigation.

As a component of the preparation of the FEIR, an intensive archaeological survey will be conducted to determine if potentially significant archaeological resources are present on the site.

16.8 Visual Impacts

The major visual features of the proposed Ashland Commuter Rail Station will be the open expanse of paved parking and those several vertical elements that include the station platform canopy, a pedestrian overpass, and station lighting.

The parking area will be set back approximately 15 feet from Pleasant Street and a landscaped planting area or buffer zone will be provided. The parking lot is planned to be similar in appearance to a parking lot of a supermarket or shopping area. There will be enough landscaping to create a pleasing environment but limited so as not to create a major maintenance requirement.

The most dominant of the vertical features will be the pedestrian ramp and stairway structure to cross over and connect the platforms on both sides of the tracks. The structure over the tracks will provide 21 feet of clearance above the tracks. The structure will have a roof and therefore will approach a total height of 30 feet. To meet the accessibility requirements the ramp must be no more than 8 percent in grade. On the north side of the tracks, a double ramp that switches back and forth will be provided and will be about 80 feet long.

On the south side, where the right-of-way is limited, a double ramp is not possible and a single ramp, approximately 230 feet long, will be used to ascend and descend from the crossover. A set of stairs also will be provided. Although the cross-over structure is a large structure in terms of a pedestrian, it is not a large structure for a site of four acres in size. Given the industrial zoning and adjacent 2-3 story buildings, the cross-over structure should not be a visual intrusion but it will be a part of the visual landscape.

The in-bound or south side platform will have a canopy of 150 feet in length and fifteen feet in height. The canopy will not be a dominant visual feature due to its relatively low height.

A potentially problematic issue at station areas is lighting and the relationship of that lighting to residential areas and abutting uses. The parking lot and station area will be lighted at night. The lighting will be operated by photoelectric cells and time clocks. The photoelectric cell detects when it becomes dusk and turns on the lights. A clock timer is used to shut off the lights approximately ½ hour after the last train passes through the station. To light the parking lot, the MBTA will use high pressure sodium luminaires (light fixture) on approximately 30 foot high light poles. The luminaires will be different from street lights in that the MBTA will use cut-off luminaires which direct the light downward with minimal spill-over onto adjacent parcels. The light source from a cut-off luminaire is not visible to a pedestrian unless standing under the light. The light from regular street lights tends to spill over to adjacent properties and is visible from a long distance. Although, the lights will be on until about 1:00 A.M. or ½ hour after the last train, they should not be a visual disturbance to abutting residential uses.

16.9 Hazardous Materials

An environmental site evaluation was performed for the proposed Ashland Station site. The purpose of the evaluation was to determine whether hazardous material or oil that may be contained in the soil and groundwater at the site within the meaning of Massachusetts General Laws, Chapter 21E (M.G.L. c.21E).

The environmental site evaluation included the following elements:

1. A review of the site's history which indicated that the site was undeveloped from at least 1875 until 1983 when the Weld Rite building was constructed. The two vacant parcels were reportedly used as softball fields from the mid 1970s until 1981 when they were purchased by the current owner and used as storage space for miscellaneous building materials.

2. A review of state and local records and information which indicated no record of the storage or release of hazardous materials or oil at the Weld Rite building site or the two vacant parcels.

3. The DEP January 15, 1993 "List of Confirmed Disposal Sites and Locations to be Investigated" identified three sites directly or indirectly affecting the Ashland Station site:

    - Nyanza Chemical is a confirmed site, where releases of hazardous materials or oil have been confirmed and require further action.

- The 3C Electrical site is a remedial site where remedial action has been completed and no further remedial actions are planned.
- The Perini Corporation located ¼ mile northwest of the site is listed as a "Location to be Investigated".

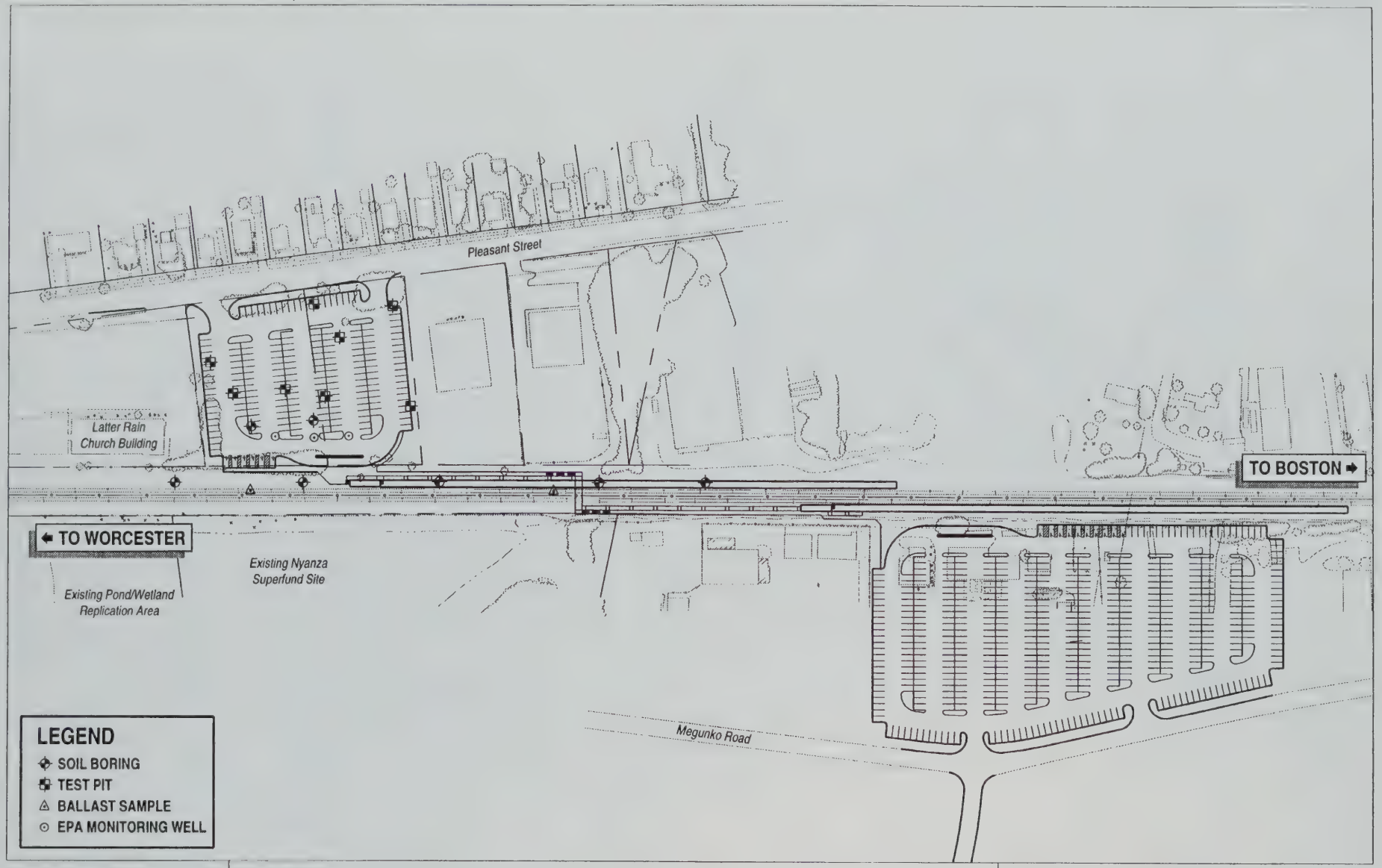
4. A subsurface exploration program consisted of seven soil borings, eight test pits and the installation of three monitoring wells. Figure 16.9-1 shows the location of wells and soil borings. Groundwater was encountered in all eight test pits. The soil boring and test pit logs are available at the MBTA project office. Soil samples were taken at each of the borings and test pits.

5. Soil and groundwater samples were analyzed in a laboratory by chemical screening methods.

The results of the environmental site evaluation indicated low levels of trichloroethane and detectable concentrations of mercury are present in the groundwater at the site. Low levels of cadmium also were detected in a composited surface soil sample and petroleum hydrocarbons were detected in the railroad ballast. The contaminants detected in the groundwater at the study site (i.e., trichloroethane and mercury) are similar to those detected during investigation conducted at the abutting Nyanza Superfund site.

In addition the evaluation indicated the following:

- A total of 31 soil samples were screened for total volatile organic compounds. Total VOC concentrations ranged from negative (below background levels) and none detected to 0.6 ppm in all 31 samples. Seven of the eight RCRA metals were not detected above typical background levels in natural soils in the composite surface soil sample GZ-104 and GZ-105. Elevated levels of cadmium (9.0 ppm) were detected in the composite sample; however, the level detected was below the reportable concentrations (established at 30 ppm) for soils within high environmental impacts areas established in the Massachusetts Contingency Plan. No pesticides or herbicides were detected in the composite soil sample GZ-104 and GZ-105.



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 200'

0 200

SITE PLAN - HAZARDOUS MATERIALS INVESTIGATION (21E) ASHLAND, MA

FIGURE 16.9-1

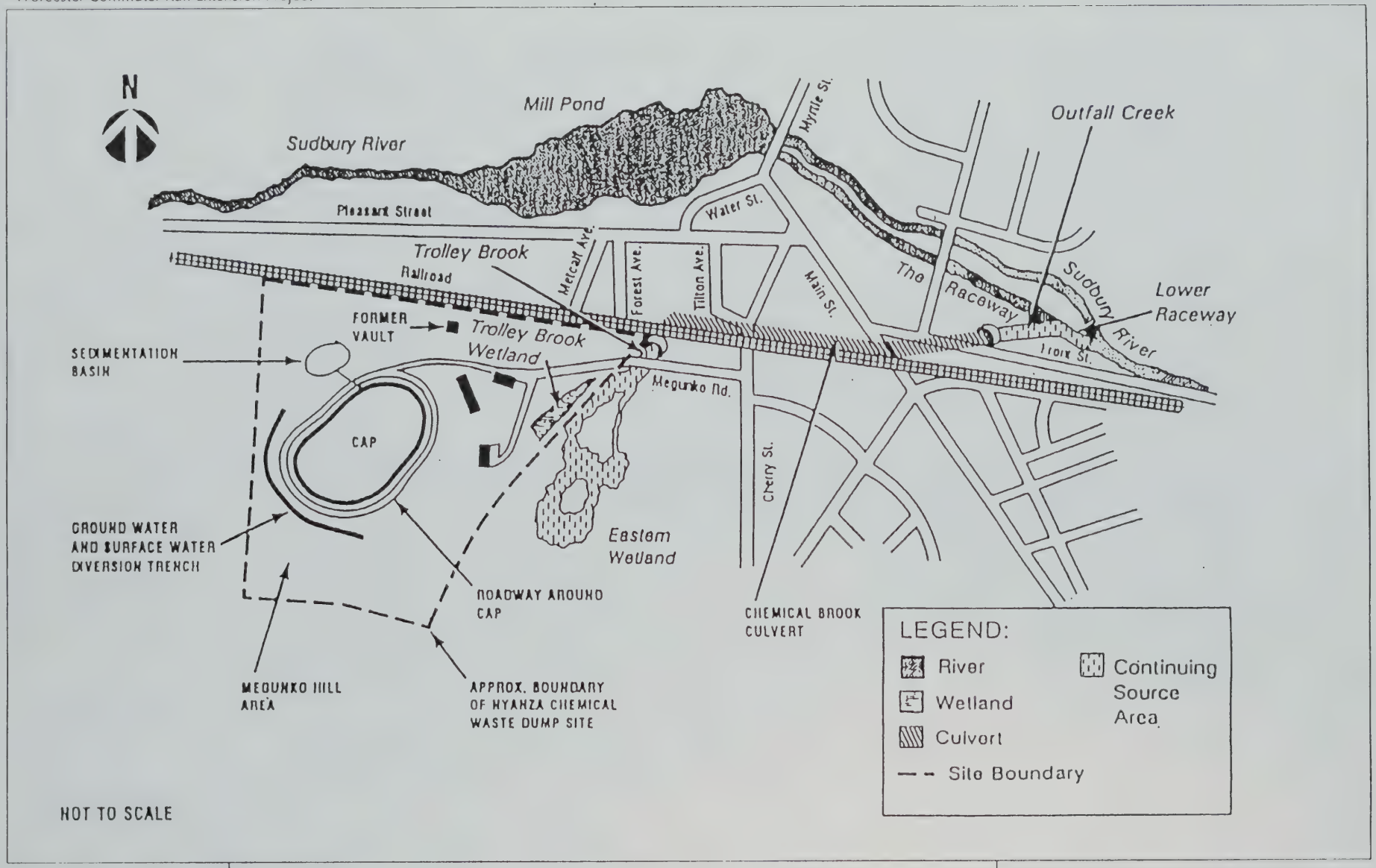
- Three groundwater samples were screened for VOCs. No listed VOCs were detected in two of the three water samples. TCE was detected in one groundwater sample GZ-101 below the method detection limit of 10 ppb. Results indicted less than 5 ppb of TCE was detected. The Massachusetts maximum contaminant level (MCL) for TCE is established at 5 ppb. Results of the pH and specific conductance screening conducted for the three groundwater samples indicated pH values ranging between 5.1 and 5.7 which are typical readings for New England groundwater.

A high level platform and overpass will be constructed on the south side of the railroad tracks near the Nyanza Site. If contamination is encountered that requires DEP notification, coordination of remediation will be carried out in accordance with all state, federal and local regulations.

Nyanza Superfund Site

The Nyanza Chemical Waste Dump Superfund Site is located directly across from the proposed station site in Ashland on the southerly boundary of the railroad right-of-way (Figure 16.9-2). Since 1917, several companies involved in the manufacture of chemical textile dyes, dye intermediates and other products have occupied the site. The most recent dye manufacturing company to occupy the site was Nyanza, Inc. which ceased operations at the site in 1978. The first type of contamination linked to dye manufacturing at the Nyanza Site was mercury which was discovered in the Sudbury River. The level of contamination discovered at the site by various state agencies during the 70's prompted the Environmental Protection Agency (EPA) to include it on the National Priorities List in 1982. This action made the site eligible for Superfund money for investigation and cleanup.

Due to the complexity of contamination discovered at the site, including contaminated soil, groundwater, surface water, sediments, and fish, EPA divided the cleanup plan into three phases. Phase I, completed in 1992, included excavating contaminated soils, sediments, and sludges from various areas, consolidating them and constructing an impermeable cap over the buried deposits. During the remedial investigations, numerous groundwater monitoring wells were installed at properties throughout the Nyanza area, three of which are located on the study site.



Massachusetts Bay Transportation Authority

NYANZA SUPERFUND SITE

FIGURE 16.9-2

Contaminants detected in these three wells during 1988 and 1990 EPA sampling rounds include dichloroethene, trichloroethane, chlorobenzene, lead, and mercury. Groundwater elevation surveys indicated a north and northeasterly groundwater flow direction. Phase II is currently underway and includes the extraction and treatment of groundwater and additional studies.

Phase III was proposed in December of 1992 to address the cleanup of mercury contaminated sediments in the wetlands and drainage ways east of the site that serve as a continuing source of contaminated sediments to the Sudbury River. Over the past two decades, concern has grown about the effect of contamination from the Nyanza Site on the Sudbury River. Mercury-contaminated fish from the Sudbury River were discovered in the 1970's and further sampling has confirmed high levels of mercury in Sudbury River fish. The river has been posted since 1986 with a health advisory warning against the consumption of fish.

Phase III has been proposed to reduce the level of mercury in sediments to background levels by dredging and dewatering sediments in the eastern wetlands and drainage ways and disposing the sediments under the cap constructed in Phase I. The target cleanup goals were established for mercury because risk assessments by EPA concluded that more than 90 percent of the total health risks associated with the site are related to mercury contaminated sediments. The EPA concluded that the major risk to human health is from regular consumption of fish from the Sudbury River, with a lesser risk associated with wading in the river. The risk to the environment is related to the accumulation of mercury in the food chain which especially affects fish and other aquatic life and the birds and mammals that feed on that aquatic life. Phase III would also include a public awareness program about the risks from eating mercury contaminated fish and possibly restricting recreational activities along the river.

The sections of the river that have prohibitions on the consumption of fish include all downstream areas as far as the Concord River and upstream areas as far as Mill Pond in Ashland. Enhancement of recreational opportunities along the Sudbury River at the Cordaville Pond impoundment have been proposed for the Southborough Commuter Rail Station as part of the Extension of Commuter Rail to Worcester. The Southborough stretch of the Sudbury River does not have a restriction on consumption of fish. Also, there are no prohibitions on the consumption of fish caught in the Cordaville Mill Pond in Southborough.

16.10 Pedestrian Safety

The CTPS ridership projections forecast 20 patrons walking to the Ashland Station on average weekday. It is assumed that these walkers would likely be from the residential areas north of Pleasant Street, and could use the existing sidewalk along the north side of Pleasant Street to reach the commuter rail station.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge, accessible to the handicapped, will be constructed over the tracks to connect station platforms to parking facilities.

16.11 Construction

Construction related impacts typically involve issues of traffic to and from the work site, air quality, noise and vibration, erosion and sedimentation,and safety. Station site work will involve clearing, excavation, foundation construction, paving and installing/erection of site facilities such as pedestrian bridges and station canopies. Construction equipment likely to be used includes graders, bulldozers, backhoes, cranes and trucks.

Construction related traffic impacts are not expected to be significant. During certain short-term phases of construction, there will be concentrated deliveries of materials, such as during paving of the parking areas. Station construction will not be particularly labor-intensive, either, and traffic generated by the labor force will not adversely affect level of service on nearby roads.

There will be short-term, intermittent increases in emissions from construction equipment and site-related construction traffic. No violations of air quality standards are anticipated.

The application of water by spraying exposed earth surfaces can minimize the potential for fugitive dust from construction vehicle traffic or from wind erosion.

Silt barriers, consisting of hay bales and silt fence can be effective in trapping sediments from construction site runoff. Limiting the area of earth exposed at any one time can be effective in minimizing both wind and water erosion. Compliance with the requirements of an order-of-conditions issued by the Ashland Conservation

Commission will ensure that adverse effects on water quality and resource areas are minimized.

Potential construction noise and vibration impacts and possible mitigation are described in the preceding Section 16.3.

Station site construction activities that present a potential safety concern would be secured by temporary fencing or other barriers. The Contractor will be required to adhere to all pertinent regulations regarding use and storage of hazardous or toxic materials on the site.

16.12 Proposed Mitigation and Mitigation Options

Ashland center has an existing intersection capacity problem in the A.M. and P.M. peak periods. Approximately 70% of the existing traffic crossing the railroad tracks in the A.M. and P.M. peak periods is travelling through Ashland Center to points north or south of the town's center.

The gate closing for the commuter rail trains or for Conrail trains worsen the traffic flow problem by reducing the capacity of the Main Street with Front Street intersection and the Main Street with Summer Street and Homer Avenue intersection. Each gate closing due to a commuter rail train will be approximately equal to the effects of the pedestrian phase of each traffic signal being activated for a pedestrian to cross Main Street.

The southern area of Ashland Center, along Route 135 (Union Street) also has an east-west capacity problem. This problem is not affected by the railroad gate closings along Main Street. The commuter rail station with parking lots on the north and south sides of the railroad tracks will decrease some of the through traffic by diverting a portion of the traffic which is driving through Ashland Center to downtown Boston to the commuter rail station's southern parking lot, relieving some of the north-south A.M. and P.M. peak period congestion.

Retiming the traffic signals to match the current and future traffic volumes can result in considerable improvements to the traffic flow through Ashland Center and help to reduced localized air pollution.

The existing north-south traffic problem could be addressed with a major capacity increase. One solution would be to widen Main Street from north of Front Street to

south of union Street to a five lane cross section. The widening of Main Street would require numerous land takings along Main Street.

An alternative solution to widening the existing north-south route (Main Street) would be to create a bypass road from Main Street south of Union Street, west to Union Street, and then northwest crossing the railroad tracks to Cordaville Road. Such a bypass road could reduce the A.M. peak hour traffic through Ashland Center by 37% and the P.M. peak hour traffic by 40%. A new road could make use of vacant land or less densely used land or use existing road segments to lessen the impacts of reducing the traffic through Ashland Center.

To address the east-west traffic congestion, Union Street would need to be widened to a five lane cross section from west of Summer Street to east of Main Street.

The MBTA is committed to helping the Town of Ashland to retime its traffic signals to account for the changes in traffic patterns due to the Ashland Commuter Rail Station. Reconstruction of existing roadway segments or construction of a by-pass route to solve existing capacity problems is certainly beyond the scope of the commuter rail extension project.

ASHLAND STATION - WEST

16.13 Local Traffic

The Ashland-West station site alternative was analyzed to determine what, if any, additional impacts might occur within the Ashland study area. The methodology for the analysis was the same as that used for the Ashland-East station site alternative. A complete analysis for the Ashland-West alternative is included in Appendix, Volume I.

Existing conditions for the Ashland-West station site alternative are the same as previously presented for the Ashland-East alternative. Figures 16.1-1 and 16.1-2 show the existing traffic volumes for the A.M. and P.M. peak hours. Figure 16.1-3 shows the existing Average Daily Traffic (ADT) and Average Weekday Traffic (AWDT) for roads within the study area.

The projected ridership for the Ashland-West alternative is the same as previously shown for the Ashland-East alternative. Projected traffic distribution is as shown in Figure 16.1-4.

Since commuter rail traffic to the Ashland-West station will be using the same routes as used for the Ashland-East analysis, impacts to the roads and intersections within the study area are the same as for the Ashland-East alternative. The results of the LOS analysis and subsequent impacts are presented in Section 16.1.

Only one intersection will experience additional impacts due to construction of the Ashland-West alternative. Additional station generated traffic would be added to the Pleasant Street/High Street intersection.

In the 1996 peak hours and peak generator hours, the intersection will operate satisfactorily in both the "No Build" and "Build" conditions. Traffic turning from High Street to Pleasant Street will have a reduction in level of service from LOS B to LOS C in the A.M. peak periods and from LOS D to LOS E in the P.M. peak periods. In the year 2001, the turning movement from High Street to Pleasant Street is expected to deteriorate to LOS F in the P.M. peak periods "Build" condition. The level of service in the A.M. peak periods will remain at an acceptable LOS C in the "Build" condition.

Summary of Findings

The impacts of construction of the Ashland-West alternative are essentially the same as previously presented in Section 16.1 for the Ashland-East alternative. Additional traffic will be added to the Pleasant Street/High Street intersection causing a reduction in level of service for High Street traffic, particularly in the P.M. peak periods.

16.14 Air Quality

Both Ashland Station alternatives provide approximately 200 commuter parking spaces north of the tracks and 500 spaces south of the tracks. Station generated traffic patterns are the same for both the East and West alternatives, with the exception of the High Street/Pleasant Street intersection under the West alternative. The Main Street/Union Street intersection is still the worst case situation for the Ashland West station. The same CO concentration predictions apply as for the Ashland East station in Section 16.2.

16.15 Noise and Vibration

Noise Impact Analysis Methodology

Because of slow train speeds near stations, the potential for noise and vibration impacts from train operations are at a minimum compared to other segments of the right-of-way. There is, however, the potential of effects on the noise and vibration environment in the vicinity of the station because of project-induced traffic on roads leading to and from station areas, as well as short-term effects during construction of platforms, parking and other site facilities.

Traffic Noise

The significance of noise impacts from project-generated traffic near proposed commuter rail stations along the corridor was assessed based on the projected noise increase relative to the noise from existing traffic on applicable roads. Because the greatest changes in traffic volumes are expected to occur during peak commuting periods, the noise increase was evaluated in terms of the peak-hour L_{eq}.

Criteria for traffic noise impact are based on existing FTA guidelines, and state that a noise level increase of greater than 5 dBA is considered to represent impact. The existing FTA criteria are used here rather than the proposed FTA criteria used in the train noise assessment because of the general, non-site specific nature of the traffic noise impact assessment. Where the existing layout of major roads will essentially remain the same, the traffic noise assessment predicts only the change in noise resulting from the projected change in traffic volumes near the stations, and not the absolute traffic noise levels at specific noise-sensitive locations in the community.

The traffic noise analysis was carried out on a relative basis, by estimating the change in peak-hour traffic noise, which is a function of the change in peak-hour traffic volume. The assumption is that all other non-project related noise sources remain unchanged.

Construction Noise and Vibration

Construction of the commuter rail station is expected to include clearing, excavation, foundation work, equipment installation, paving and finishing. Construction machinery is likely to include the types of equipment typically used for light industrial construction, such as graders, bulldozers, backhoes, cranes and trucks. Construction will typically occur during 8 to 10 hour weekday, daytime periods.

Station construction can be categorized in two distinct operations—parking lots and platform areas—with total duration of construction of approximately eight months.

For a typical station site, the distance to significant noise impact was estimated to be 200 feet measured from the closest area of construction. In cases where noise-sensitive land uses were concentrated in a location very close to either the platform area or the parking area, separate screening distances were used to assess the two construction scenarios.

Station construction noise exposure was estimated using equipment noise levels and scenarios that are typical for non-residential construction (EPA, 1971). Usage factors were assigned to each piece of equipment to determine a cumulative reference noise level to use in determining the width of the noise impact zone.

Noise impact criteria for construction are based on the outdoor Annual Average Day-Night Equivalent Sound Level (AA L_{dn}), with a threshold of 65 AA L_{dn} defining the impact zone. This metric is slightly less conservative than the 24-hour L_{dn} used for train noise impact, given the short-term nature of construction noise impact. (A complete definition of metrics and terms pertaining to noise and vibration used in this report are given in Appendix, Volume II, Section 3.0).

The impact criteria for construction vibration are essentially the same as for train operations, except that impact is assessed only when the activity will occur for 30 days or more at a given location. Ground-borne vibration from construction was estimated based on equipment source data found in literature (Wiss, 1974; FHWA, 1982; FTA, 1990) . Vibration projections were made for the main equipment categories, based on the relative amount of energy imparted to the ground. Details on this methodology are given in the Appendix. A screening distance of 85 ft measured from nearest area of construction was estimated for vibration impact from general construction activity at stations.

Traffic Noise Impacts

The north side parking lot is located off High Street just west of the intersection with Cordaville Road and Pleasant Street. Both of these roads will be the primary access route for station patrons from the north side of the railroad. The peak hour L_{eq} is projected to increase by less than 1 dBA due to traffic volume increasing by a factor of only about 1.03. No noise impact is projected for residences on Pleasant Street or Cordaville Road.

Traffic destined for the parking lot south of the tracks would result in volume increasing by a factor of 1.2 during the P.M. peak hour along Union Street between Summer Street and the parking lot driveway, and a slightly lesser increase south of the driveway. The peak hour L_{eq} would increase by less than 1 dBA, therefore, no traffic noise impact would occur due to station generated traffic.

The new two lane, 4,000 foot long access drive into the south side parking lot will traverse vacant and no significant traffic noise impact is anticipated.

Construction Noise and Vibration Impacts

Land use near the Ashland Station-West site includes a restaurant adjacent to the parking lot and one commercial building near the station platform. Both structures fall within the screening distances for construction noise and vibration impact.

Traffic Noise Mitigation

No significant traffic noise impact was identified for the Ashland Station-West site.

Construction Noise and Vibration Mitigation

To minimize construction noise impact, the following mitigation measures can be implemented:

- Using the quietest equipment possible, e.g. by ensuring that all diesel-powered construction equipment has effective mufflers, and by substituting electric for diesel-powered equipment and hydraulic for pneumatic equipment where possible;
- Locating noisy construction equipment as far as possible from noise-sensitive locations and limiting equipment idling on site;
- Installing temporary noise barriers between noise-sensitive receptors and particularly noisy or close construction operations.

During the project design phase, specific construction noise limits will be developed and incorporated into the contract specifications, along with requirements for noise monitoring to certify compliance with the specified limits.

All of the potential vibration impacts from construction identified are related to annoyance effects and not to building damage effects, and will occur only during daytime hours. Following are some procedures that can be used to minimize the potential for annoyance from construction vibration:

- Restrict procedures that contractors can use in vibration-sensitive areas, and specify alternative techniques that generate lower vibration levels.
- Restrict the hours of vibration-intensive activities and the use of heavy-duty equipment to weekdays during daytime hours.
- Require vibration monitoring during vibration-intensive activities.

16.16 Site Drainage

The proposed Ashland Station-West Alternative lies within the Sudbury River Watershed. Existing land uses include a restaurant at the intersection of Pleasant Street and High Street north of the tracks, and an undeveloped wooded area south of the tracks. Soil conditions north of the track are classified as "somewhat excessively drained" soils on glacial outwash plains. Soil conditions south of the track are classified as very poorly drained soils consisting of loam and fine sandy loam.

The north side site consists of a restaurant, a gravel parking area and various vegetation. The site slopes generally towards High Street, across High Street and overland to the Sudbury River. Portions of the site drain to an existing low area within the site. This area is approximately three feet deep and is identified as flood plain on Flood Insurance Rate Map (FIRM) for the Town of Ashland, community panel number 2501790001 dated July 16, 1981.

The south side site consists of a low lying wooded area and drains in an easterly direction to the wetland replication area north of the Nyanza Superfund site.

The proposed project development would consist of 700 paved parking spaces (200 spaces north and 500 spaces south of the railroad tracks), sidewalks, platforms, stairs, ramps, a pedestrian overpass, lighting and landscaping. A new 4,000 foot long roadway would be proposed to access the south side parking area.

As previously discussed in Section 3, construction of a south side parking area would alter over 5,000 square feet of bordering vegetated wetlands and require permits under the Federal 404 program (administered by the Army Corps of Engineers) and a variance under the Massachusetts Wetlands Protection Act. Design of a commuter rail station at this location will be further advanced only after all other reasonable alternatives are determined to be infeasible. Drainage design in that event would include those elements described in Section 16.4 as well as implement those conditions and recommendations made by the Ashland Conservation Commission and the Massachusetts Department of Environmental Protection.

16.17 Wetlands and Wildlife

The south side parking for the Ashland Station West alternative would require filling approximately 2 acres of a Red Maple swamp. The Red Maple swamp is dominated by woody trees and shrubs with a predominance of skunk cabbage or wetland ferns forming the herbaceous layer. Ground water levels appear to be near the surface over much of the area. The site appears to be in or on the margin of a "High Priority Site of Rare Species Habitats and Exemplary Natural Communities" (see Figure 7.0-1, panel 7 of 8).

Construction on this site may require a variance from the Wetlands Protection Act. A detailed wetland delineation, assessment and replication plan would be developed if the Ashland Station East alternative proves infeasible.

16.18 Historic Properties and Sites

The Ashland Station-West site vicinity contains a limited number of existing buildings, all north of the railroad tracks. Architectural inventory forms will be completed for this site. It is anticipated that effects on any potential National Register property would be primarily visual. See Section 7.8 for a description of potentially historic properties.

16.19 Archaeological Resources

The archaeological reconnaissance survey undertaken for the EIR process included the Ashland Station-West vicinity. The survey indicates that the station area has a high probability of containing pre-historic sites, although there are no known sites. Much of the proposed station site north of the tracks has been disturbed by existing development.

As a component of preparation of the FEIR, an intensive archaeological survey will be conducted to determine if potentially significant archaeological resources are present on the site.

16.20 Visual Impacts

The major visual features of the commuter rail station will be the open expanse of paved parking and those several vertical elements that include the station platform canopy, a pedestrian overpass, and station lighting.

The parking area will be set back approximately 15 feet from abutting streets and a landscaped planting area or buffer zone will be provided. The parking lot is planned to be similar in appearance to a parking lot of a supermarket or shopping area. There will be enough landscaping to create a pleasing environment but limited so as not to create a major maintenance requirement.

The most dominant of the vertical features will be the pedestrian ramp and stairway structure to cross over and connect the platforms on both sides of the tracks. The structure over the tracks will provide 21 feet of clearance above the tracks. The structure will have a roof and therefore will approach a total height of 30 feet. To

meet the accessibility requirements the ramp must be no more than 8 percent in grade.

Given the general lack of nearby residential development, the overall visual impact of the Ashland Station-West alternative would be minor.

16.21 Hazardous Materials

An environmental site evaluation has not been performed for this station alternative. If further development of the site is pursued, an evaluation will be undertaken. Since the station location is upgradient of the Nyanza Site, and the area south of the tracks is undeveloped, there is a low probability of hazardous materials being present.

16.22 Pedestrian Safety

The CTPS ridership projections forecast 20 patrons walking to the Ashland Station on an average weekday. It is assumed that these walkers would likely be from the residential areas north of Pleasant Street, and could use the existing sidewalk along the north side of Pleasant Street to reach the commuter rail station.

As noted elsewhere, intertrack fencing will be constructed through the station area to discourage pedestrian crossing of the tracks. A pedestrian bridge accessible to the handicapped will be constructed over the tracks to connect station platforms to parking facilities.

16.23 Construction

Construction related impacted would generally be similar to those described for the Ashland Station-East alternative in Section 16.11.

16.24 Proposed Mitigation and Mitigation Options

For proposed mitigation and mitigation options for the Ashland Station West Alternative, see Section 16.12.

SECTION 17.0 REGIONAL STATION ANALYSIS

In the process of identifying and evaluating commuter rail station sites, consideration was given to locating a regional station at I-495; however, this option proved to be impractical as a near-term goal. The following pages discuss potential ridership, issues relating to regional station sites, and station access to the interstate highways.

17.1 Introduction

Siting a regional commuter rail station at the interchange of two interstate highways represents an ideal situation in terms of user access and visibility. The interchange of the Massachusetts Turnpike and I-495 in Westborough, located in the center of the commuter rail extension service area and immediately adjacent to the railroad mainline tracks, presents just such an opportunity. A large capacity parking facility at this location could service riders from numerous communities within the service area who would travel to the station site via major highways, thereby minimizing traffic impacts on the local roadways.

One of the major complications to construction of a regional station in this area is that much of the adjacent undeveloped lands are included in the Cedar Swamp Area of Critical Environmental Concern. Under provisions of state law, the Secretary of Environmental Affairs is empowered to identify, designate, and protect areas of critical environmental concern (ACEC). Once an area is designated, any proposed activity in the ACEC will be subject to close scrutiny by EOEA and other concerned state agencies. The Massachusetts Turnpike and I-495 were constructed prior to enactment of the ACEC legislation; however, any proposed expansion of highway, railroad, or transit facilities proposed in this area would be subject to scrutiny as noted above.

While there is no absolute prohibition against a public benefit project encroaching into an ACEC, any wetland impact automatically results in the requirement that a variance to the Wetlands Protection Act be sought. One of the requirements relating to issuance of a variance is the determination that there is no practical alternative to

the wetland impacts. As described later in Section 17.2, the ridership projections indicate that overall ridership will not be increased significantly by construction of a regional station; most users will only be diverted from other intermediate stations at Westborough, Southborough, and Ashland. The low ridership impact of a regional station plus the high cost of construction would make demonstration of no practical alternative difficult.

It is estimated that the environmental clearance and permitting process, plus final design and construction time, could preclude bringing a regional station into service prior to the year 2006.

Construction of a regional station at the junction of I-90 and I-495 presents two major obstacles - first, finding a suitable station site, and second, providing good access to the station site from the interstate highways. These two issues are discussed in Section 17.3.

17.2 Impact of Regional Station on Ridership

The Central Transportation Planning Staff (CTPS) prepared ridership estimates for the commuter rail extension for several alternative station scenarios, including building all intermediate stations including a regional station at I-495, and building the intermediate stations without a regional station. Table 17.2-1 summarizes estimated inbound boardings at the various stations for the year 2011.

Table 17.2-1 Ridership Impacts of Regional Station at I-495 Year 2011

Estimated Daily Inbound Commuter Rail Trips to Boston and Cambridge			
Station	**Without Regional**	**with Regional**	**Net Change**
Worcester	448	448	0
Millbury	195	195	0
Grafton	149	149	0
Westborough	263	211	-52
Regional (I-495)	-	546	+546
Southborough	725	498	-227
Ashland	946	867	-79
Total	**2,726**	**2,914**	**+188**

As shown in the table, construction of a regional station at I-495, in conjunction with all of the other proposed intermediate stations, results in a net increase in total

ridership of only 188 people in the year 2011. While the regional station is projected to attract 546 riders, most of these commuters are diverted from other stations.

CTPS also estimated ridership for a scenario in which the only stations were Worcester and the regional station at I-495. Total daily inbound boardings in the year 2011 are estimated to be 1,939, of which 1,290 patrons would use the regional station. While this usage would approach the ideal for a regional station, this alternative does not address the project goal of providing commuter rail service to the corridor by 1996, since the regional station could not be implemented for 10 to 12 years because of the environmental issues related to station and highway access construction.

Although no specific ridership estimates were prepared for an alternative in which a regional station and all intermediate stations except Westborough were constructed, one could reasonably expect that the Westborough station patrons would use the regional station. Under this scenario, regional station usage would be approximately 757 daily inbound boardings in the year 2011.

If the regional station at I-495 and the Westborough station were not built, and none of the Westborough patrons diverted to other stations, inbound boardings in the year 2011 are estimated to be 2,463, very nearly the stated 2,500 patron threshold for successful commuter rail service. For this scenario, implementation of a regional station as a long range goal in lieu of near term implementation of the Westborough station could be a viable alternative. Construction of both a Westborough station and a regional station would not increase total ridership significantly enough to justify the cost of a regional station.

The original vision of a regional station, as outlined in the Feasibility Study, was a large station with a parking capacity of 1,000 vehicles that would attract riders from the interstate highway network. As noted above, this level of usage would be obtained if the regional station was the only intermediate stop between Worcester and Framingham.

The EOEA Scope for this DEIR asks *"Is it likely that any of the local stations would become the defacto regional station prior to commencement of the regional station?"* The CTPS projections indicate that implementation of a regional station in conjunction with all of the proposed intermediate stations would divert patrons from Westborough (52), Southborough (227) and Ashland (79), assuming no constraints on parking. These estimated diversions suggest that Southborough would, more than the other two stations, become a defacto regional station. More realistically, without a regional station and with the Southborough station restricted to surface parking

only, estimated ridership at Ashland will increase to 1093 patrons out of an estimated total ridership of 2701. In this case, the Ashland station would accommodate over 40% of all inbound boardings, becoming the defacto regional station.

17.3 Regional Station Site Alternatives

A regional station would require excellent access from I-495 to a site of several acres immediately adjacent to the rail line. Four possible sites were evaluated, as shown on Figure 17.3-1 and 17.3-2:

Fruit Street

Conrail Auto Terminal

Cumberland Farms Building

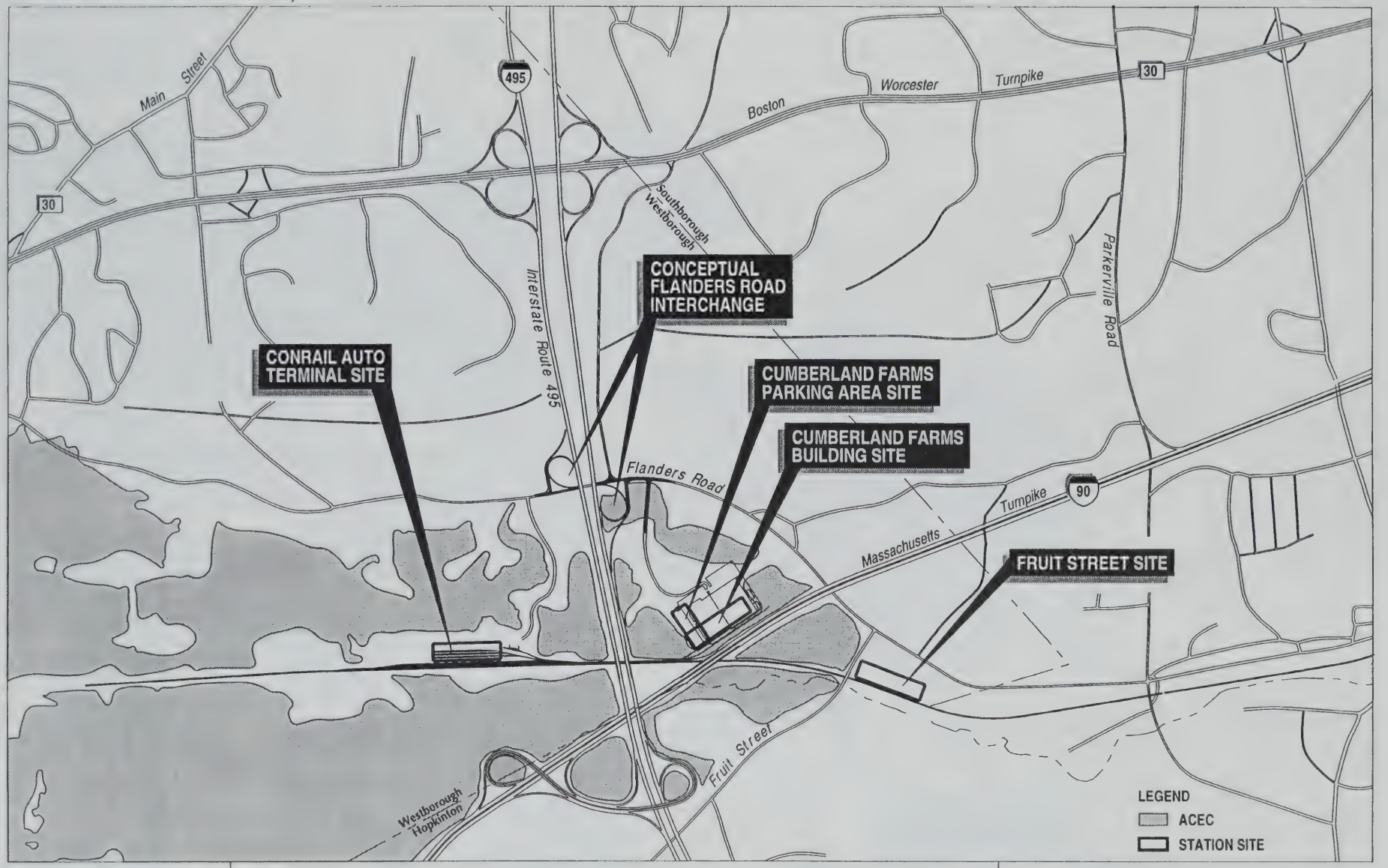
Cumberland Farms Parking Area

Fruit Street Site

The 1990 Feasibility Study proposed this as the site of a regional station, with 1,000 parking spaces. To make this location viable, it was proposed to provide direct access to Fruit Street from the existing Turnpike Exit 11A/I-495 interchange, requiring extensive relocation of local roads in Hopkinton. The interchange improvements are estimated to cost approximately $15,000,000. Construction of the commuter rail station would displace two to four residences and two businesses. Roadway access improvements would displace five new residences in Hopkinton.

Without improvement in access to the interstate, the Fruit Street site is not viable, as the station has no reasonable secondary access route that could be used until the interchange reconstruction was completed.

The I-90/I-495 interchange improvements are not justified for any transportation need other than station access. There is strong local opposition to the concept, since direct access to I-90 and I-495 is perceived to result in development pressure on an otherwise quiet residential area.



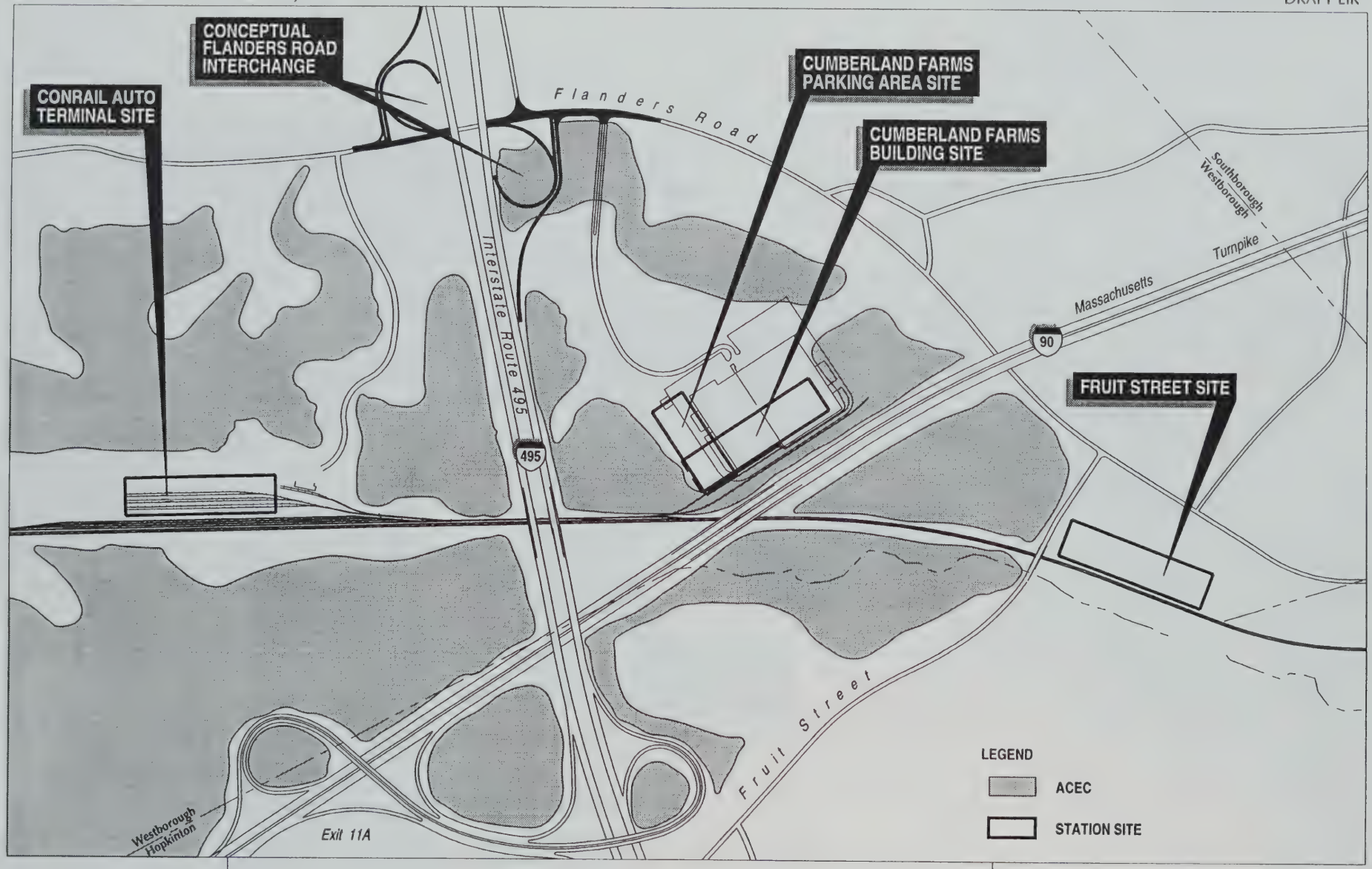
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000'±

0 2000

REGIONAL STATION STUDY AREA WESTBOROUGH, MA

FIGURE 17.3-1



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 900'±

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ALTERNATIVE REGIONAL STATION SITES WESTBOROUGH, MA

FIGURE 17.3-2

Conrail Auto Terminal Site

The Conrail Auto Terminal in Westborough is one of only three such terminals that supply new cars to the Northeast. Conrail has invested heavily in this site as well as in mainline clearance improvements necessary to accommodate the hundreds of special car carriers purchased to expand the business of hauling new cars.

A Draft Environmental Impact Report (DEIR) for expansion of this facility, submitted to MEPA by Conrail in 1989, documented that no suitable alternative sites exist that would accommodate an expanded terminal. The expansion plans have a projected investment cost of between 20 and 90 million dollars, giving some indication of Conrail's commitment to this facility. To date, the wetland impacts associated with the project have delayed project advancement.

The MBTA has discussed with Conrail options for use of the site for commuter rail; Conrail has ruled out any joint use of the facility, and expressed a desire to remain there. The federal legislation that created Conrail prohibits the acquisition of the Conrail site by eminent domain. A "guesstimate" purchase price of the site is in the range of $30,000,000; Conrail has no suitable alternative site, and would not likely be a willing seller.

Even if the Conrail property became available, the site does not have direct access from I-90 or I-495. It is only accessible from I-495 via the Route 9 interchange and then the congested Route 9 interchange with Flanders Road, a travel distance of two miles. The Massachusetts Highway Department and the Town of Westborough are currently evaluating alternatives to address existing safety and capacity problems at Route 9/Flanders Road. The addition of traffic from a 500-1000 car commuter rail facility would worsen existing congestion at that location.

Cumberland Farms Building Site

The Cumberland Farms site is a very large and relatively new facility. The property includes a 500,000 square foot building with associated parking and loading facilities. The site is accessed by a 2500 foot long driveway off Flanders Road. There is rail access to the site and building as well.

Assuming a modest value of $ 40.00 per square foot, the building alone is worth approximately $ 20,000,000. The Chapter 11 filing by Cumberland Farms would not lower the value of this site if taken by eminent domain.

Currently the building serves two major functions. The easterly portion of the building serves as a distribution facility for various dairy products and includes some

general office space. The westerly portion of the building includes a large bakery area as well as some warehouse space. Truck circulation is maintained around the total perimeter of the building and loading facilities exist on all four sides.

The Cumberland Farms building is not directly on the mainline tracks and a station on this site would involve a long walk to the platform. Wetlands within the ACEC are in the same area as the desired platform location. The variance procedure required to permit filling wetlands in an ACEC could, in fact, block construction of a station in this area.

Although the site is clearly visible from both I-90 and I-495, highway access is not direct. Access to the site is available via Flanders Road but is about 3 miles from the intersection of I-495 and Route 9. Improved access could be provided by constructing a new interchange at Flanders Road and I-495 (which would also provide some relief of I-495/Route 9 congestion). The improvements would cost approximately $ 5,000,000 and require several years for environmental and design review.

Use of the Cumberland Farms building for commuter rail also would present a conflict with operations at the Conrail terminal. Sidings to the Conrail facility extend beyond the Cumberland Farms site. Frequent commuter rail operations would interfere with operations at the terminal.

Cumberland Farms Parking Area

The minimum requirements for a regional station with 500 parking spaces at the Cumberland Farms site would require the taking/leasing of lands west of the existing building, including the demolition of a 4000 square foot garage. In addition, a right-of-way through the existing access driveway would need to be negotiated.

Construction of the regional station parking lot would eliminate all loading facilities along the westerly section of the building, eliminate railroad access to the building, constrict the circulation around the building, and require some reconfiguration of the internal building facilities and operations.

A railroad siding located south of the building, (which services 3 additional buildings to the north and east of the Cumberland Farms property) would need to be maintained. Freight operations on this siding could conflict with both vehicular and pedestrian movements to and from the regional station platforms.

If the total ridership at the regional station increased significantly from the estimated 546 patrons, the taking of a portion of the Cumberland Farms building would probably be required to accommodate parking demand.

Construction of a regional station at the Cumberland Farms site would require all the typical items associated with construction of other commuter rail stations, including: double platforms, pedestrian overpass, associated ramps and stairways, and parking lot. In addition there are several site specific issues and impacts associated with a station at this location, including the following:

- Distance from the end of the parking lot to platforms would exceed 800 feet.
- Pedestrians would be required to cross a rail siding.
- Vehicles also would be required to cross a rail siding.
- The vehicle "drop-off" areas would be located approximately 200 feet from the platform.
- The handicap parking area would be located approximately 150 feet from the platform.
- The existing Massachusetts Turnpike bridge over the railroad would need to be widened to accommodate the relocated rail sidings and the station platforms.
- Construction of the station would include the alteration of wetland resources within a portion of the ACEC.

Roadway Access to Regional Station

One of the major obstacles for a regional station at any of the four sites evaluated is the lack of direct access to the interstate roadway system. Although each site can be accessed from Flanders Road via Route 9, adding station traffic to the already overburdened Route 9 interchanges at I-495 and Flanders Road is undesirable.

Provision of new access to I-495 would require approval by the Federal Highway Administration and likely would require preparation of a federal environmental impact statement.

The earlier commuter rail feasibility study proposed reconstruction of the I-90/I-495 interchange to provide direct access to Fruit Street and the Fruit Street station. The potential impacts on the local area resulted in opposition from Hopkinton and Westborough. Reconstruction of this interchange would not improve access to the other sites considered.

A concept for a new interchange on I-495 just north of the railroad crossing was evaluated to provide access to either the Conrail Terminal site or the Cumberland Farms site. In both cases, construction would severely impact the ACEC and the interchange would serve only the commuter rail station traffic. Because of the

proximity of the existing interchange at I-90, construction of a new interchange would likely require major reconstruction of I-495 as well, to provide collector-distributor roadways. This interchange concept was deemed impractical.

The third concept proposed construction of a partial clover leaf interchange at I-495 and Flanders Road (See Figure 17.3-2). This site, located midway between the interchanges with I-90 and Route 9, would involve less mainline reconstruction on I-495. The interchange would relieve congestion on the Route 9 interchanges at I-495 and Flanders Road as well as provide access to all of the sites evaluated for a regional commuter rail station.

Of the three interchange concepts evaluated, the Flanders Road alternative appears to be the only feasible one. If implemented, construction of the interchange would involve the following:

- Approximately 12 acres of land takings.
- Reconstruction/Replacement of existing I-495 northbound and I-495 southbound bridges over Flanders Road.
- Wetlands and other environmental impacts and mitigation.
- Widening and reconstruction of approximately 2,000 feet of Flanders Road.
- Traffic signals at the intersection of Flanders Road and the new ramps.

Costs

Estimated construction costs of a regional station and the required access improvements to I-495 are presented below for the four alternative station sites evaluated.

Table 17.3-1 Comparative Construction Cost Estimates, Alternative Regional Station Sites

	Fruit Street	Conrail Terminal	Cumberland Farms Building	Cumberland Farms Parking
Land Damages	$5,000,000	$30,000,000	$20,000,000	$3,000,000
Access	15,000,000	5,000,000	5,000,000	5,000,000
Design-EIS	2,000,000	2,000,000	2,000,000	2,000,000
Station	3,000,000	3,000,000	5,000,000	5,000,000
Conrail	-	-	3,000,000	3,000,000
TOTALS	**$25,000,000**	**$40,000,000**	**$35,000,000**	**$18,000,000**

Note: Fruit Street access cost for reconstruction of I-90/I-495 interchange. Other access costs for new interchange at Flanders Road/I-495

SECTION 18.0 ENVIRONMENTAL IMPACTS—FRAMINGHAM STATION

The MBTA has under study, as a separate project to be filed with MEPA, proposed improvements to the existing Framingham Station. Extension of commuter rail to Worcester will result in additional gate closings at the Bishop Street and Concord Street grade crossings in Framingham. The MBTA is committed to working with Framingham officials toward the resolution of traffic and parking concerns associated with train operations.

18.1 Status of Framingham Station Project

The Massachusetts Bay Transportation Authority (MBTA) proposes to improve commuter safety, accessibility, track operations, and parking at Framingham Station, currently the terminus for Boston metrowest commuter rail service.

The proposed project will consist of two phases. Phase 1 will include construction of a pedestrian overpass with handicapped access; extension of the inbound platform to approximately 730 feet and the outbound platform to approximately 815 feet with covered access; installation of an intertrack fence to address safety issues; and reconstruction of parking south of the tracks with an increase from 40 to 50 spaces, including several handicapped accessible spaces, and a commuter drop-off/pick-up area.

Approximately 1,400 linear feet of track will be relocated to increase the sub-standard track centers from 12 feet to 14 feet. The existing south-east wye track, which crosses Waverly Street at grade, will be retired from service.

Phase 2 improvements will include the drainage improvements and construction of an additional parking area to the north of the proposed platforms built in Phase 1.

The proposed project will upgrade track operations for inbound and outbound rail traffic and provide a safer and more accessible environment for MBTA commuters in

conformance with the Americans with Disabilities Act. The Phase 1 improvements will be addressed in a separate MEPA process; an ENF will be submitted by the MBTA in late 1994. Phase 2 is not currently programmed.

18.2 Gate Closings

Scheduled train operations through the Bishop Street and Concord Street (Route 126) grade crossings result in gate closings to allow safe passage of MBTA commuter trains, Amtrak intercity passenger trains, and Conrail freight trains. Although schedules are subject to change, and unscheduled freight runs can add to the scheduled gate closings, presently the gates at the above streets close for 31 MBTA, 6 Amtrak, and 10 Conrail trains (total 47 gate closings).

With the institution of MBTA Interim Service from Worcester in the Fall of 1994, there will be three inbound trains from Worcester to Boston and three outbound trains from Boston to Worcester. One each of the inbound and outbound trains will be part of the current Framingham-Boston schedule, thus four additional gate closings will result (total 51 gate closings). By late 1996, the MBTA plans to commence with Basic Service between Worcester and Boston. There will be ten inbound trains from Worcester to Boston and ten outbound trains from Boston to Worcester. Six each of the inbound and outbound train will be part of the current Framingham-Boston schedule, thus eight additional gate closings will result (total 55 gate closings). If demand for additional off-peak commuter service warrants, the Basic Service can become Expanded Service. Under the Expanded Service, with 16 trains to and from Worcester, most will become part of the current Framingham - Boston schedule and result in only one additional gate closing compared to Basic Service (total 56 gate closings).

Traffic problems, particularly for the north-south demand along Route 126, have been well documented. Recent consultation with the Framingham Town Planner and Town Engineer confirms the need for a corridor study to address congestion and unacceptable level of service through south Framingham. As a minimum, the study should address seven intersections from Irving Street—Hollis Street (Route 126) on the south to Lincoln Street—Concord Street (Route 126) on the north. A closed loop traffic control system could result in substantial improvements, but a more extensive (and expensive) solution could involve a new by-pass roadway of the problem area.

The proposed MBTA commuter rail extension project will add gate closings (up to nine closings in addition to the existing 47 closings) some of which will occur during peak traffic periods. Congestion and delays will increase. Where a LOS F condition exists, the condition will worsen somewhat.

On a positive note, most of the new Worcester trains will run express from Framingham to Boston for the morning commute and express from Boston to Framingham in the evening. Existing scheduled trains immediately before or after the express trains could lose some patronage to the express trains, with resulting shifts in parking demand. Overall, parking demand should be spread over a longer timeframe. In addition, license plate surveys indicate a number of Worcester commuters now drive to and park at the Framingham and West Natick commuter rail stations. Capturing some of these commuters at the Worcester Station is quite likely, as is the capture of other commuters from west of Framingham at the proposed stations between Worcester and Framingham. The result, although not quantifiable, should provide some relief to the Framingham traffic and commuter parking situation.

18.3 Proposed Mitigation and Mitigation Options

The MBTA is committed to work with Framingham officials toward the resolution of traffic and parking concerns associated with train operations. Realizing that the traffic impacts of the proposed project only add somewhat to an already unacceptable situation, and that a large scale study, design, and construction effort likely will be required to provide an acceptable solution for the movement of through traffic (reported to be 70%-80% of the total traffic), the Executive Office of Transportation and Construction, the Massachusetts Highway Department, the Town of Framingham and the MBTA should be involved in the solution, including a funding program.

The initial commitment by the MBTA will include the following:

- Monitor Interim Service operations.
- Perform ridership surveys
- Perform travel time studies of Route 126 prior to and after commencement of Interim Service.
- Monitor Framingham parking demand relative to Station Improvements (Phase 2)
- Provide signage for parking at municipal parking lots and garage.

SECTION 19.0 ENVIRONMENTAL IMPACTS—BOSTON SOUTH STATION/BACK BAY STATION

This section addresses issues related to increased pedestrian traffic and train operations at South Station and Back Bay Station that will result from restoration of commuter rail service to Worcester. The City of Boston Transportation Department currently is evaluating strategies to address pedestrian traffic problems in the South Station/Dewey Square area. The MBTA and the Central Artery project have been participants in development and evaluation of possible solutions. Operational analyses have determined that the South Station platforms and approach tracks can accommodate the increased train traffic without adverse effects on operations.

19.1 Pedestrian Traffic

Commuters taking the proposed commuter rail service from Worcester can use the Back Bay Station or South Station terminus to connect with other transportation modes or walk to their destinations. MBTA operating statistics indicate that approximately 40% of the commuter rail passengers riding the current south side service get off at the Back Bay Station and the remaining 60% get off at South Station. The additional 2,300 commuters (by Year 2001) projected for the Worcester service most likely will follow a similar pattern.

South Station

South Station has been renovated as part of the South Station Transportation Center project (SSTC). This improvement project has been designed to rehabilitate South Station into a multimodal transportation center for rail, bus, rapid transit, automobile and airport link operations. Renovations to the terminal have provided better access into and out of the station, removed obstacles to pedestrian movements and improved signage within the station so that the station can better accommodate pedestrians. Construction is under way for Phase II A of the SSTC project. Phase II

A includes a bus terminal which will improve indoor connections for pedestrians further and mitigate vehicular/pedestrian conflicts in the vicinity of South Station.

Approximately 15 million people a year pass through South Station. Although pedestrian traffic is very congested, this number is still well below the 40 million people a year that used the Station during the peak of rail transportation in the 1920's.

A pedestrian impact analysis was carried out as part of the Final Environmental Impact Report submitted in 1988 for the South Station Transportation Project. The analysis identified pedestrian impacts in terms of changes in the levels of service for different pedestrian spaces. The pedestrian spaces included street corners, crosswalks, and walkways within the area of South Station and Dewey Square. A level of service for pedestrians is defined in terms of pedestrian area or pedestrian flow rate. Figure 19.1-1 illustrates levels of service for pedestrians as defined by the Highway Capacity Manual. Existing levels of service range from LOS A to LOS F for the corners, crosswalks, and walkways in the vicinity of South Station. The conclusion of the analysis was that the level of service for most of the pedestrian spaces would either remain the same or be reduced by one level as a result of the opening of the South Station Transportation Center (SSTC).

Completion of three major projects since the distribution of the SSTC EIR has resulted in a change in pedestrian volumes in the vicinity of South Station. One Financial Center, a 1.1 million square foot office building, has been completed and contributes additional pedestrians. The Needham Branch Commuter Rail Reconstruction Project has been completed and contributes approximately 1,500 pedestrians to South Station and 1,500 pedestrians to Back Bay during the AM and PM peak commuting periods. The Red Line modernization has been completed and the pedestrian walkways under Atlantic Avenue allow pedestrians to directly access commuter rail and bus without having to use the outside pedestrian crosswalks in the vicinity of the South Station.

The MBTA has expressed a commitment to develop a package of mitigation measures and to work with the City of Boston regarding the SSTC so that additional pedestrians can be accommodated safely and local streets are not adversely impacted. A Transportation Access Plan was submitted to the City of Boston Transportation Department in June of 1991. The Plan included mitigation measures to minimize adverse impacts to vehicular and pedestrian traffic.

LEVEL OF SERVICE A

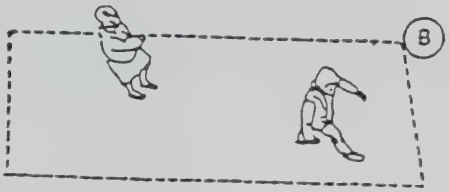
Pedestrian Space: ≥ 130 sq ft/ped Flow Rate: ≤ 2 ped/min/ft

At walkway LOS A, pedestrians basically move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected, and conflicts between pedestrians are unlikely.

LEVEL OF SERVICE B

Pedestrian Space: ≥ 40 sq ft/ped Flow Rate: ≤ 7 ped/min/ft

At LOS B, sufficient area is provided to allow pedestrians to freely select walking speeds, to bypass other pedestrians, and to avoid crossing conflicts with others. At this level, pedestrians begin to be aware of other pedestrians, and to respond to their presence in the selection of walking path.



LEVEL OF SERVICE C

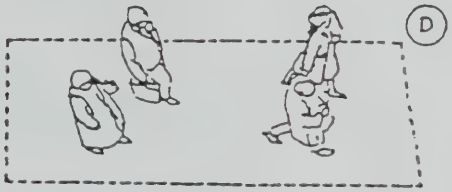
Pedestrian Space: ≥ 24 sq ft/ped Flow Rate: ≤ 10 ped/min/ft

At LOS C, sufficient space is available to select normal walking speeds, and to bypass other pedestrians in primarily unidirectional streams. Where reverse-direction or crossing movements exist, minor conflicts will occur, and speeds and volume will be somewhat lower.

LEVEL OF SERVICE D

Pedestrian Space: ≥ 15 sq ft/ped Flow Rate: ≤ 15 ped/min/ft

At LOS D, freedom to select individual walking speed and to bypass other pedestrians is restricted. Where crossing or reverse-flow movements exist, the probability of conflict is high, and its avoidance requires frequent changes in speed and position. The LOS provides reasonably fluid flow; however, considerable friction and interaction between pedestrians is likely to occur.



LEVEL OF SERVICE E

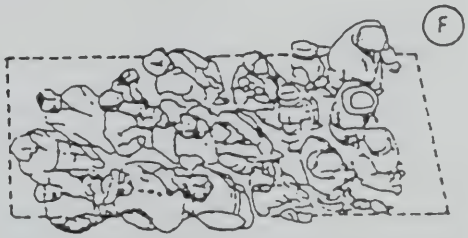
Pedestrian Space: ≥ 6 sq ft/ped Flow Rate: ≤ 25 ped/min/ft

At LOS E, virtually all pedestrians would have their normal walking speed restricted, requiring frequent adjustment of gait. At the lower range of this LOS, forward movement is possible only by "shuffling." Insufficient space is provided for passing of slower pedestrians. Cross- or reverse-flow movements are possible only with extreme difficulties. Design volumes approach the limit of walkway capacity, with resulting stoppages and interruptions to flow.

LEVEL OF SERVICE F

Pedestrian Space: ≤ 6 sq ft/ped Flow Rate: variable

At LOS F, all walking speeds are severely restricted, and forward progress is made only by "shuffling." There is frequent, unavoidable contact with other pedestrians. Cross- and reverse-flow movements are virtually impossible. Flow is sporadic and unstable. Space is more characteristic of queued pedestrians than of moving pedestrian streams.



Massachusetts Bay Transportation Authority

Source: Highway Capacity Manual, Special Report 209

PEDESTRIAN LEVELS OF SERVICE

FIGURE 19.1-1

The City of Boston Transportation Department currently is performing a study of the South Station/Dewey Square pedestrian traffic activity. Existing pedestrian traffic counts and projected foot traffic volumes verify that previous studies correctly identified problem areas including street corners, crosswalks, and walkways. Several of the pedestrian areas exhibit a LOS E or less during peak periods. Studies, which will result in a report in the Fall of 1994, have included elevated walkways, underground passages and at-grade solutions. It has been reported that only the latter are currently being considered. An at-grade solution likely will employ traffic officers, who will attempt to achieve a balance in the service functions of vehicular and pedestrian movements. Some modification of traffic signal phasing in the area is likely also.

Although individual project impacts—such as the Old Colony or Framingham Extension Commuter Rail lines—are not factored into the numbers of pedestrians, an increase in pedestrian volumes is anticipated in the determination of impacts and in possible mitigation measures. Although the Boston Transportation Department has yet to issue its report, it is expected to reveal that pedestrians added by the Framingham Commuter Rail Extension Project will not impact significantly the pedestrian movements in the area. It is expected also that the condition will improve greatly with proper traffic management.

Back Bay Station

The Back Bay Station is a modern intermodal station that serves passengers on the MBTA south side commuter rail system, AMTRAK inter-city rail, the Orange Line of the Rapid Transit System, MBTA Bus, and private inter-city bus (Bonanza). Trackage and station improvements at Back Bay were part of the Southwest Corridor Project which included Orange Line relocation, arterial street construction, and construction of a new station at Back Bay. The first Back Bay station opened in 1899 but burned in 1928. The second station, opened in 1929 was closed in 1979 and razed in 1981 as part of the Southwest Corridor Project.

Pedestrian movements at Back Bay Station are provided for at several locations. There is a direct indoor connection between the Orange line and commuter rail. The MBTA buses drop off and pick up at the entrance to the station off Clarendon Street. The Bonanza buses drop off and pick up at the station entrance on Dartmouth Street. A pedestrian walkway under Dartmouth Street allows pedestrians to access the station without having to conflict with vehicle movements.

As discussed for South Station, although the number of pedestrians in the vicinity of Back Bay Station will increase with the extension of commuter rail to Worcester, the

increase will be relatively small and level of service will not be significantly different. If warranted, the MBTA is prepared to work with the Boston Transportation Department following the same commitment as has been made at the South Station area.

19.2 Approach and Platform Track Capacity at South Station

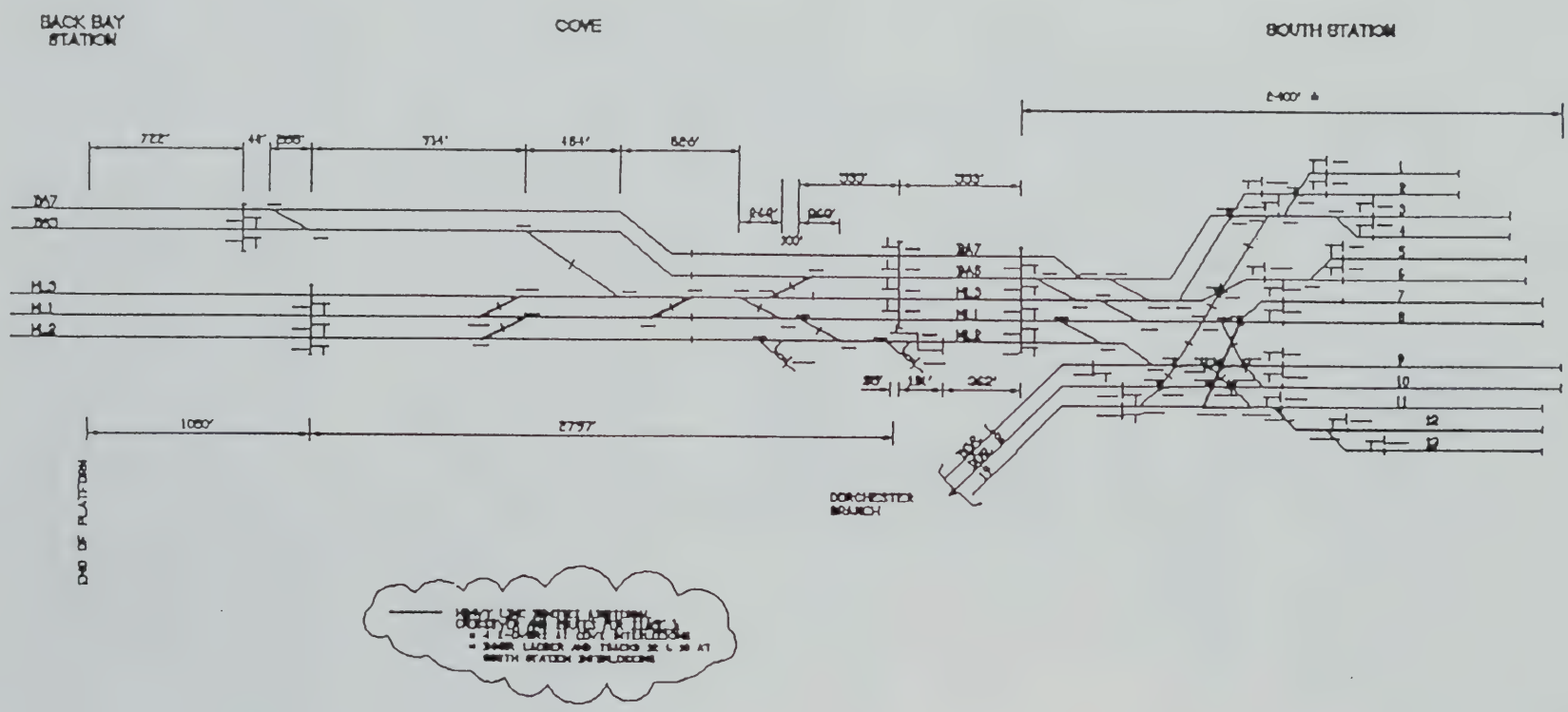
The ability of South Station to provide efficient commuter and inter-city rail service is dependent on the approach track configuration into South Station and the number of station platform tracks at the terminal. Figure 19.2-1 illustrates the approach and platform trackage at South Station.

Approach Track Configuration

Currently, eight approach tracks terminate at South Station. Two include the Boston and Albany lines from the west (Conrail's Main Line) which serve Conrail freight, MBTA's Framingham Line, and Amtrak inter-city service. The proposed project would be served on these two tracks as part of the current Framingham Line. The proposed Worcester service, operating as an extension of the current Framingham service, would add only five (5) trains in the morning and four (4) trains in the evening. Three approach tracks include Main Lines 1,2 and 3 from the south and southwest. These serve the MBTA's Needham, Franklin and Stoughton Lines and Amtrak's Shore Line Main Line to New York. The three remaining tracks approach from the south and currently serve the MBTA's Dorchester Branch and Fairmont Line. These three tracks also provide access to service and inspection facilities. In the future, Old Colony service would access South Station using the most easterly of these three tracks and a possible additional track.

The approach track configuration also is known as the "throat". The term "throat" refers to the narrowing down of the approach tracks just outside of the Station where switches, signals and trackage are configured to allow trains from all the lines coming into South Station to cross over and access any of the platform tracks.

The Central Artery/Third Harbor Tunnel Project (CA/T) may require approach track and signal reconfigurations at South Station that will be carried out in five major construction stages. The need for staged track construction is contingent on the exact method of tunneling to be used under the South Station track approaches. The most



Massachusetts Bay Transportation Authority

APPROACH AND PLATFORM TRACKAGE

FIGURE 19.2-1

restrictive track and signal configuration for South Station approach trackage would occur during Stage No. 2 and continue until Stage No. 5.

An analysis of impacts of the Worcester Service to approach track capacity and operations was carried out assuming the most restrictive track configuration. The results of this conservative analysis, included in the November 3, 1992 report entitled *Operating Analysis, (Sub-Stage No. 7) Impact of Worcester Service*, indicate that the proposed schedule of Worcester train service will not adversely affect rail movements through the throat during or following CA/T planned construction.

Station Platform Tracks

The South Station Terminal provides platform tracks for passengers using the six lines of the MBTA south side service and Amtrak's inter-city service. The proposed rehabilitation of the Old Colony Railroad also would be served from South Station.

An operational analysis was carried out to determine if the additional trains needed for the extension of service to Worcester on the Framingham Line could be accommodated by platforms at South Station.

The South Station terminal currently has 11 platform tracks available for boarding passengers. At the completion of Phase II A of the SSTC project (discussed in Section 19.1), an MBTA bus terminal will be built on Air Rights Level 1 and two additional platform tracks will become available. An existing platform track that is not currently used for operational reasons ultimately will become available and an additional new track will be built in the vicinity of the current interim ground level bus terminal.

The operational analysis of station platform track occupancies took a conservative approach and assumed only eleven tracks available. In addition to all the existing trains using the platform tracks, the analysis also assumed that the Old Colony service would be in operation and occupying some of the platform tracks.

The Worcester service would add a total of four train sets of equipment to the system. The operational analysis used the current South Station train scheduling and Platform Track Occupancy program. The analysis determined that the proposed Worcester Service can be accommodated by the platforms at South Station and will not adversely affect South Station MBTA commuter rail or Amtrak inter-city service.

APPENDICES

ENF SUBMISSION

MEPA CERTIFICATE, OCTOBER 8, 1992

MEPA CERTIFICATE, OCTOBER 22, 1992

NOTICE OF PROJECT CHANGE, NOVEMBER 29, 1993

MEPA CERTIFICATE (INTERIM SERVICE), JANUARY 14, 1994

CAC COMMENTS

ENF SUBMISSION

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

ENVIRONMENTAL

NOTIFICATION FORM

Worcester Commuter Rail Extension Project

Connecting Worcester and the MetroWest Communities to Downtown Boston

Prepared By:

EDWARDS AND KELCEY, INC.

Boston, Massachusetts

ENVIRONMENTAL NOTIFICATION FORM

I. SUMMARY

A. Project Identification

1. Project Name WORCESTER COMMUTER RAIL EXTENSION PROJECT
   Address/Location Framingham, Ashland, Southborough, Westborough, Grafton, Millbury and Worcester
   City/Town
2. Project Proponent Mass Bay Transportation Authority
   Address 10 Park Plaza, Boston, MA 02116
3. Est. Commencement December 1993 . Est. Completion June 1995 .
   Approx. Cost $ 80,000,000 . Status of Project Design 10 % Complete.
4. Amount (if any) of bordering vegetated wetlands, salt marsh, or tidelands to be dredged, filled, removed, or altered (other than by receipt of runoff) as a result of the project.
   Approx. 0.9 acres _____ square feet.
5. This project is categorically included and therefore requires preparation of an EIR.
   Yes _____ No X ?

B. Narrative Project Description
Describe project and site.

The Massachusetts Bay Transportation Authority (MBTA) proposes to extend commuter rail service from Framingham to Worcester, thereby connecting Downtown Worcester and several MetroWest communities with Downtown Boston. Commuter rail service was provided in the past between Worcester and Boston but was terminated in 1975 because of low ridership. A study prepared in 1990 indicates that ridership forecasts would support the feasibility of the extension project. The current Boston to Framingham commuter rail service would be extended 23 miles to Worcester on the existing rail corridor owned by Conrail. The proposed commuter rail service is expected to serve approximately 2,500 commuters between Worcester and the corridor communities and Boston for a total daily ridership of approximately 5,000 passengers. The two components of the proposed project include track and signal improvements and construction of new stations. Intermediate stations at each of the five communities along the rail line are planned. The proposed intermediate station locations are:

- Ashland (Pleasant Street) - parking for 400 cars
- Southborough (Route 85) - parking for 400 cars
- Westborough (Otis Street - Route 9) - parking for 600 cars
- Grafton (Tufts/Biotech Park) - parking for 300 cars
- Millbury (Exit 11, Mass Turnpike) - parking for 400 cars

The terminus of the project will be the Union Station area in Downtown Worcester with parking for 400 cars. The Worcester Terminus is not included in this ENF. The Terminus will be the subject of a separate ENF after the City of Worcester and the Worcester Regional Transit Authority agree on the development plans for Union Station.

See Appended Sheet - Project Description

Copies of the complete ENF may be obtained from (proponent or agent):
Name: Diana Parcon Firm/Agency: MBTA
Address: 10 Park Plaza, Boston, MA 02116 Phone No. 617-722-3123

THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.
For Information, call (617) 727-5830

Project Description *Continued*

Track and Signal Improvements

Track and signal improvements include the laying of a section of second track, the rebuilding or repair of some bridges and signal improvements. Approximately eleven miles of second track would be laid between Westborough and Worcester (see Sheet 5, 6 and 7). The existing track roadbed is wide enough to accommodate a second track and it is not expected that filling or grading will be required. Figure 1 shows a typical cross section of the track roadbed. The section of railroad between Framingham and Westborough, including the area adjacent to the Westboro Cedar Swamp Area of Critical Environmental Concern (ACEC) is already double-tracked. The 23 miles of right-of-way will be fenced with a 6-foot chainlink fence.

In Grafton the Pine Street bridge would be rebuilt to achieve the required horizontal clearance for the double track. The former street crossing at the Grafton Tufts University/Biotech Park Station site will be reconstructed as a pedestrian overpass. The required vertical clearance for commuter rail service can be achieved with the existing bridges.

A new signal and communications system would be designed that will enable Conrail Freight, Intercity Rail (Amtrak) and Commuter Rail (MBTA) to operate safely on the rail corridor. Signal improvements would include upgrading existing signals and the placement of some new signals on the existing railroad right of way.

Station Locations/Layover Facility

The five intermediate station sites were selected after a review of the entire rail corridor and specific analysis of many potential sites. The initial sites evaluated included the station stops identified in the 1990 Feasibility Study and the original station stops that once served this corridor.

Several engineering, traffic, access, environmental and community factors were considered during the evaluation of potential locations. The proposed station locations have the site capacity to accommodate an 800 foot long high level platform on a straight section of track and have an area large enough for required parking. Parking requirements vary depending on location but each site has a parking area of at least 300 spaces with the capacity for expansion in the future. The stations are served by major roads and are near population centers where commuters live. No significant environmental impacts are anticipated and access through a residential subdivision is not required for any of the sites.

The Commuter Rail Stations will be designed as modern intermodal transportation facilities. The principal elements of a station include an 800 foot long platform and parking. The platform will be high level platform that will allow direct access to a rail coach without climbing steps of a rail coach. The platforms will be fully accessible and meet the recently enacted access requirements of the Americans with Disabilities Act. Parking lots will be sized according to need at each station. The parking lots will have landscaping and lighting.

See Project Description *Continued*

Project Description *Continued*

The siting of a major regional commuter rail station at Route I-495 in Westborough was evaluated during the Schematic Design Phase and remains a long-term goal of MBTA. This site for a station has been identified because of the intersection of Route I-495, I-90 (Mass Turnpike) and the Rail Line. The feasibility of such a station, however, depends upon the availability of land, a new or expanded highway interchange, avoidance of Conrail freight conflicts and avoidance of wetlands in the Cedar Swamp Area of Critical Environmental Concern (ACEC). While it is still a goal of the MBTA to have a regional station at I-495, the project will at this time focus only on the five intermediate stations that can be constructed within the desired time frame.

A layover facility in the vicinity of the Worcester terminus would provide a site for the trains to be stored at night so that they can begin service to Boston in the morning. The engines of the locomotives at the layover facility would not run all night but would be electrically heated to minimize noise, conserve fuel and maintain the diesel engines at the necessary temperature.

C. List the State or Federal agencies from which permits or other actions have been/will be sought:

Agency Name	Permit	Date filed; file no.
ACOE		Section 404 Permit
USEPA		NPDES Stormwater Discharge Permit
MDEP		Water Quality Certificate
MHD		Curb Cut Permit
Conservation Commissions of Ashland, Southborough, Westborough, Grafton, Millbury and Worcester		Orders of Conditions or Determination of Applicability

D. List any government agencies or programs from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
Commonwealth of Massachusetts	100%

E. Areas of potential impact (complete Sections II and III first, before completing this section).

1. Check all areas in which, in the proponent's judgment, an impact of this project may occur. Positive impacts, as well as adverse impacts, may be indicated.

	Construction Impacts	Long Term Impacts
Inland Wetlands	X	X
Coastal Wetlands/Beaches		
Tidelands		
Traffic	X	X
Open Space/Recreation		
Historical/Archaeological		
Fisheries/Wildlife		
Vegetation/Trees	X	X
Agricultural Lands		
Water Pollution	X	
Water Supply/Use		
Solid Waste		
Hazardous Materials		
Air Pollution	X	X (positive)
Noise	X	X
Wind/Shadow		
Aesthetics		X
Growth Impacts		X
Community/Housing and the Built Environment		
Other (Specify)		

2. List the alternatives which have been considered.

1) No - Build
2) Extension of Commuter Rail to Worcester Only
3) Extension of Commuter Rail to Worcester and Milford
4) Extension of Commuter Rail to Marlborough only
5) Extension of Commuter Rail to Marlborough and Milford
6) Improvements in Bus Service

F. Has this project been filed with EOEA before? No X Yes _____ EOEA No. _____

G. WETLANDS AND WATERWAYS

1. Will an Order of Conditions under the Wetlands Protection Act (c.131s.40) or a License under the Waterways Act (c.91) be required?
   Yes X No _____
2. Has a local Order of Conditions been:
   a. issued? Date of issuance _____ ; DEQE File No. _____ .
   b. appealed? Yes _____ ; No X .
3. Will a variance from the Wetlands or Waterways Regulations be required? Yes X ; No _____ .

   Variance required to fill over 5000 sq. ft. of wetlands in Grafton.

II. PROJECT DESCRIPTION

A. Map; site plan. Include an original 8½ x 11 inch or larger section of the most recent U.S.G.S. 7.5 minute series scale topographic map with the project area location and boundaries clearly shown. If available, attach a site plan of the proposed project.

See Sheets 1 through 8, Project Location

B. State total area of project: Rail ROW 223 acres. **Station Sites: 31 acres (5 sites)**

* Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed ..... 13 acres
2. Open Space/ Woodlands/Recreation 6 acres
3. Wetlands ..... **Approx.** 0.9 acres
4. Floodplain ..... 0 acres
5. Coastal Area ..... 0 acres
6. Tidelands ..... 0 acres
7. Productive Resources
   Agriculture ..... 0 acres
   Forestry ..... 0 acres
8. Other ..... 12 acres
   Open-Undeveloped

* **Area refers to five proposed station sites only.**

C. Provide the following dimensions, if applicable:

	Existing	Increase	Total
Length in miles	23	0	23
Number of Housing Units	NA	NA	NA
Number of Stories	NA	NA	NA
Gross Floor Area in square feet	NA	NA	NA
Number of parking spaces	0	2100	2100
Total of Daily vehicle trips to and from site (Total Trip Ends)	0	5546	5546
Estimated Average Daily Traffic on road(s) serving site			
1. Pleasant Street, Ashland	11,000 ('92)	944	11,944
2. Rt. 85, Southborough	5,549 ('89)	944	6,493
3. Otis Street, Westborough	7,460 ('89)	1416	8,876
4. Rt. 30, Grafton	4,560 ('91)	708	5,268
5. Rt. 122, Millbury	15,743 ('89)	944	16,687

D. TRAFFIC PLAN. If the proposed project will require any permit for access to local roads or state highways, attach a sketch showing the location and layout of the proposed driveway(s).

See Station Plans

III. ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: Explain direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result. Positive impact may also be listed and explained.

Also, state the *source* of information or other basis for the answers supplied. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. Might the project affect the condition, use, or access to any open space and/or recreation area?

No. Running additional trains on the track for Commuter Rail Service will not affect the condition, use or access to any open space and/or recreation area. The sites proposed for station locations in Ashland and Southborough could improve public access to recreation/conservation land adjacent to the Sudbury River.
Source: Edwards and Kelcey

2. Is the project site within 500 feet of any public open space, recreation, or conservation land?

Yes. The existing 23 mile long rail right-of-way is adjacent or near many public open space and recreation areas such as small parks, ball fields, and wetland or woodland areas. In Westborough, the railroad passes through the Westborough Cedar Swamp ACEC. The proposed station sites in Ashland and Southborough are near or adjacent to recreation and conservation land associated with the Sudbury River such as the River Walk in Ashland.
Source: Edwards and Kelcey

B. Historic and Archaeological Resources

1. Might any site or structure of historic significance be affected by the project? (Prior consultation with Massachusetts Historical Commission is advised.)

Explanation and Source:

The Massachusetts Historical Commission has been consulted. MHC has noted that the project area includes several properties listed on the State and National Register of Historic Places. The MBTA will work closely with MHC to address historic and archaeological issues.
Source: MHC Letter, July 24, 1992; MBTA

2. Might any archaeological site be affected by the project? (Prior consultation with Massachusetts Historical Commission is advised.)

Explanation and Source:

The Massachusetts Historical Commission has been consulted. MHC has noted that several archaeological sites have been recorded within or adjacent to the project area. The MBTA will work closely with MHC to address historic and archaeological issues.
Source: MHC Letter, July 24, 1992; MBTA

C. Ecological Effects

1. Might the project significantly affect fisheries or wildlife, especially any rare or endangered species? (Prior consultation with the Massachusetts Natural Heritage Program is advised).

Explanation and Source:

The Massachusetts Natural Heritage and Endangered Species Program has been consulted and is currently reviewing the project.
Source: Edwards and Kelcey

2. Might the project significantly affect vegetation, especially any rare or endangered species of plant? (Prior consultation with the Massachusetts Natural Heritage Program is advised.)
(Estimate approximate number of mature trees to be removed: 300)
Explanation and Source:

The Massachusetts Natural Heritage and Endangered Species Program has been consulted and is currently reviewing the project. The MBTA will work closely with the Natural Heritage Program staff with regard to replacement of trees wherever possible.
Source: Edwards and Kelcey

3. Agricultural Land. Has any portion of the site been in agricultural use within the last 15 years? If yes, specify use and acreage.

Explanation and Source:

No. The railroad right-of-way has been in use for over 100 years. The proposed station locations are developed sites, wooded but previously disturbed sites or wooded sites that have not been in agricultural use within the last 15 years.

Source: Edwards and Kelcey

D. Water Quality and Quantity
1. Might the project result in significant changes in drainage patterns?

Explanation and Source:

No. Drainage patterns for the existing railroad right-of-way will not be changed. Runoff from the station parking areas will remain on-site. The station sites will be designed so that there will be no significant increase in the Pre-Development and Post-Development peak runoff rates at each site.

Source: Edwards and Kelcey

2. Might the project result in the introduction of any pollutants, including sediments, into marine waters, surface fresh waters or ground water?

Explanation and Source:

No. An Erosion/Sedimentation Control BMP will be developed for the construction phase. The Stormwater Management BMP for the station sites will include catch basins with oil and grease traps. The layover facility will have drip pans and oil/water separators. These measures will ensure that water quality impacts are minimized.
Source: Edwards and Kelcey

3. Does the project involve any dredging? No _X_ Yes _____Volume _____ . If 10,000 cy or more, attach completed Standard Application Form for Water Quality Certification, Part I (314 CMR 9.02(3), 9.90, DEQE Division of Water Pollution Control).

4. Will any part of the project be located in flowed or filled tidelands, Great Ponds, or other waterways? (Prior consultation with the DEQE and CZM is advised.)

Explanation and Source:

Yes. The existing rail right-of-way crosses several waterbodies and waterways including the Sudbury River, tributaries to the Sudbury River, tributaries to the Assabet River, the Suasco Reservoir and streams in the Blackstone River basin. The proposed station in Ashland is approximately 400 feet from the Sudbury River, separated by homes and Pleasant Street. The Southborough station is adjacent to the Sudbury River and associated wetlands. The Westborough station is approximately 500 feet from Hocomonco Pond separated by Smith Value Parkway. The Grafton station is within a wetland area. The Milbury station is adjacent to a small stream and would require a stream crossing for the access road.
Source: MDEP and Edwards and Kelcey

5. Will the project generate or convey sanitary sewage? No _____ Yes __X__
If Yes, Quantity: __500__ gallons per day
Disposal by: (a) Onsite septic systems ..... Yes _____ No __X__
(b) Public sewerage systems (location; average and peak daily flows to treatment works) ..... Yes __X__ No _____

Explanation and Source:

Yes. During construction chemical toilets will be provided for construction personnel. These wastes will be deposited and treated offsite. It is possible that the sanitary wastes generated on the trains will be disposed of at the layover facility via a pumpout station feeding into the City of Worcester sewer system. Restrooms for railroad personnel will be provided at the layover facility. In total, approximately 500 gallons per day will be generated by the project.
Source: Massachusetts Bay Transportation Authority

6. Might the project result in an increase in paved or impervious surface over a sole source aquifer or an aquifer recognized as an important present or future source of water supply?

Explanation and Source:

No. The proposed station in Westborough is in a different subdrainage basin and is approximately 1000 feet from the Zone II of three town wells. The actual wells are approximately 1 mile south of the station site.

Source: MDEP, Water Supply Protection Atlas

7. Is the project in the watershed of any surface water body used as a drinking water supply?

Explanation and Source:

No. Reservoir Number 2 in Ashland/Framingham is not currently used as a drinking water supply by the MWRA.

Source: Massachusetts Water Resources Authority

8. Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?

Explanation and Source:

No. There are no active public drinking water wells within a 1/2 mile radius of the project. There are no known private wells within a 1/2 mile radius of the proposed station locations. The existing rail right-of-way passes through suburban and rural areas and it may be assumed that there are some residences on private wells within 1/2 miles of the right-of-way.
Source: DEP, Town Water Departments, Edwards and Kelcey

9. Does the operation of the project result in any increased consumption of water?
   Approximate consumption ___500___ gallons per day. Likely water source(s) City of Worcester
   Explanation and Source:

Yes. The layover facility will have restrooms for railroad personnel and a fire protection system. The intermediate stations will not have restrooms.

Source: Massachusetts Bay Transportation Authority

E. Solid Waste and Hazardous Materials
   1. Estimate types and approximate amounts of waste materials generated, e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures. How/ where will such waste be disposed of?
      Explanation and Source:

Solid waste generated by the construction of the project includes excavate, construction debris and felled trees. After construction, solid waste will consist of trash collected at the stations. All materials will be properly disposed of or recycled.

Source: Edwards and Kelcey

   2. Might the project involve the generation, use, transportation, storage, release, or disposal of potentially hazardous materials?
      Explanation and Source:

No. The project will not directly involve the generation, use, transportation, storage, release or disposal of potentially hazardous materials. Fuel and oil will be stored and handled in accordance with State and Federal regulations.

Source: Edwards and Kelcey

   3. Has the site previously been used for the use, generation, transportation, storage, release, or disposal of potentially hazardous materials?

The proposed station sites are not on the DEP *1992 List of Confirmed Disposal Sites and Locations to be Investigated*. Some properties are listed that are near but not adjacent to station sites in Ashland and Westborough. The Pearl Street Rail Yard in Framingham is listed as a Confirmed Site. Prior to land purchase for station sites, the MBTA will conduct a hazardous materials investigation pursuant to the Massachusetts Oil and Hazardous Material Release Prevention and Response Act (M.G.L. c. 21E) and the Massachusetts Contingency Plan (310 DMR 40.00).
Source: MA DEP List of Confirmed Disposal Sites and Locations to be Investigated.

F. Energy Use and Air Quality
   1. Will space heating be provided for the project? If so, describe the type, energy source, and approximate energy consumption.
      Explanation and Source:

Yes. Heating will be provided in the crew quarters and equipment shed at the layover facility. Heating will likely be by electricity from the local power company. The demand is estimated to be approximately 29 Kilowatts.

Source: Edwards and Kelcey

2. Will the project require process heat or steam? If so, describe the proposed system, the fuel type, and approximate fuel usage.

   Explanation and Source:

No. Process heat or steam is not required for the operation of commuter rail service.

Source: Edwards and Kelcey

3. Does the project include industrial processes that will release air contaminants to the atmosphere? If so, describe the process (type, material released, and quantity released).

   Explanation and Source:

No. The operation of commuter rail and ancillary facilities does not include industrial processes that release air contaminants to the atmosphere.

Source: Edwards and Kelcey

4. Are there any other sources of air contamination associated with the project (e.g. automobile traffic, aircraft traffic, volatile organic compound storage, construction dust)?

Yes. During construction, vehicles and machinery will emit exhaust and some construction dust will be generated. Construction dust will be minimized by wetting exposed areas as needed. During operation, sources of air contamination will be the diesel locomotives and vehicles using the stations. Conrail Freight and Amtrak currently operate on the existing right-of-way and the project is not expected to result in a significant change in air quality. The project is expected to have an overall net positive effect on air quality by providing an alternative to commuting by private car.
Source: Edwards and Kelcey

5. Are there any sensitive receptors (e.g. hospitals, schools, residential areas) which would be affected by air contamination caused by the project?

No. Although, the existing 23 mile long rail right-of-way passes through residential and commercial areas, the air quality impacts associated with the project are not expected to have an impact on any sensitive receptors.

Source: Edwards and Kelcey

G. Noise

1. Might the project result in the generation of noise?

   (Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

   Explanation and Source:

Yes. Some short term construction related noise will be generated during the construction of the project. Work will occur during normal daytime hours and noise suppression systems on the equipment will be maintained. The operation of the commuter rail trains will generate noise along the rail right-of-way currently used by Conrail Freight and Amtrak. The new commuter trains and locomotives are quieter than the Conrail freight trains and improved track design such as continuously welded rail with resilient fasteners will minimize track associated noise. The operation of commuter rail trains is not expected to result in a significant increase in noise levels.
Source: Edwards and Kelcey

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project?

Explanation and Source:

No. Although, the existing 23 mile long rail right-of-way passes through residential and commercial areas, the noise impacts associated with the project are not expected to have an impact on any sensitive receptors. The station locations are in or near population centers where commuters live. Conrail Freight and Amtrak currently operate on the right-of-way and the project is not expected to result in a significant increase in noise levels.

Source: Edwards and Kelcey

3. Is the project a sensitive receptor, sited in an area of significant ambient noise?

Explanation and Source:

No. The commuter rail extension project is not a sensitive receptor and will not be affected by any ambient noise.

Source: Edwards and Kelcey

H. Wind and Shadow

1. Might the project cause wind and shadow impacts on adjacent properties?

Explanation and Source:

No. The proposed stations and operation of the commuter trains will not cause wind and shadow impacts on adjacent properties.

Source: Edwards and Kelcey

I. Aesthetics

1. Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use?

Explanation and Source:

No. The station canopies will be compatible with existing adjacent structures.

Source: Edwards and Kelcey

2. Might the project impair visual access to waterfront or other scenic areas?

Explanation and Source:

No. Operation of commuter rail service and construction of the proposed stations will not impair visual access to any scenic areas. Opportunities for improved visual access to the Westborough Cedar Swamp ACEC will be provided to commuter rail passengers.

Source: Edwards and Kelcey

IV. CONSISTENCY WITH PRESENT PLANNING

Discuss consistency with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

The proposed extension of commuter rail to Worcester is consistent with land use, transportation, open space, recreation and environmental plans and policies for the area. The proposed commuter rail service is expected to serve approximately 2,500 commuters between Worcester and the corridor communities and Boston for a total daily ridership of approximately 5,000 passengers. Improvements in public transit support the long term goals of reducing highway congestion and improving air quality. Identification of opportunities for improving access and use of open space and recreation areas has been initiated. The stations will be designed to be compatible with adjacent land use.

V. FINDINGS AND CERTIFICATION

A. The public notice of environmental review has been/will be published in the following newspaper(s):

(NAME) Middlesex News (Date) _____

Worcester Telegram and Gazzette _____

Boston Globe _____

Boston Herald

B. This form has been circulated to all agencies and persons as required by 301 CMR 11.24.

8/7/92
Date

Signature of Responsible Officer or Project Proponent

Jane Chmielinski
Name (print or type)

Address 10 Park Plaza
Boston, MA 02116

Telephone Number 617-722-3152

_____
Date

Maryann T. Magner
Signature of person preparing ENF (if different from above)

Maryann T. Magner
Name (print or type)
Edwards and Kelcey

Address 529 Main Street
Boston, MA 02129

Telephone Number 617-242-9222

FORMS OF NOTICE

(1) PUBLIC NOTICE OF ENVIRONMENTAL REVIEW

PROJECT: WORCESTER COMMUTER RAIL EXTENSION PROJECT
(Brief description of project)

LOCATION: Framingham, Ashland, Southborough, Westborough, Grafton, Millbury and Worcester

PROPONENT: Massachusetts Bay Transportation Authority

The undersigned is submitting an Environmental Notification Form ("ENF") to the Secretary of Environmental Affairs on or before August 17, 1992.
(Date)

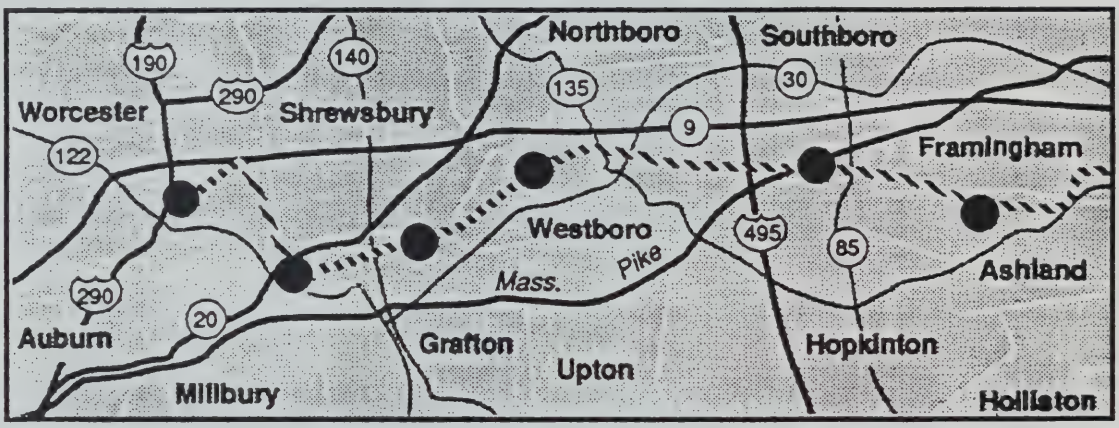
This will initiate review of the above project pursuant to the Massachusetts Environmental Policy Act ("MEPA", G.L. c. 30, secs. 61, 62-62H). Copies of the ENF may be obtained from:

Diana Parcon, MBTA, 10 Park Plaza, Boston, MA 02116 (617)-722-3123.
(Name, address, phone number of proponent or proponent's agent)

Copies of the ENF are also being sent to the Conservation Commission and Planning Board of Framingham (Municipality). Ashland, Southborough, Westborough, Grafton, Millbury and Worcester where they may be inspected.

The Secretary of Environmental Affairs will publish notice of the ENF in the Environmental Monitor, will receive public comments on the project for twenty days, and will then decide, within ten days, if an Environmental Impact Report is needed. A site visit and consultation session on the project may also be scheduled. All persons wishing to comment on the project, or to be notified of a site visit or consultation session, should write to the Secretary of Environmental Affairs, 100 Cambridge Street, Boston, Massachusetts 02202, Attention: MEPA Unit, referencing the above project.

By John J. Haley, Jr., General Manager
(proponent)



● **Proposed Station Sites**

Massachusetts Bay Transportation Authority

Project Locus

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts

MATCH TO SHEET 2 OF 8

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

Source: USGS
Framingham Quadrangle

Project Location

Sheet 1 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

Source: USGS
Framingham, Marlborough, Milford, Medfield Quadrangles

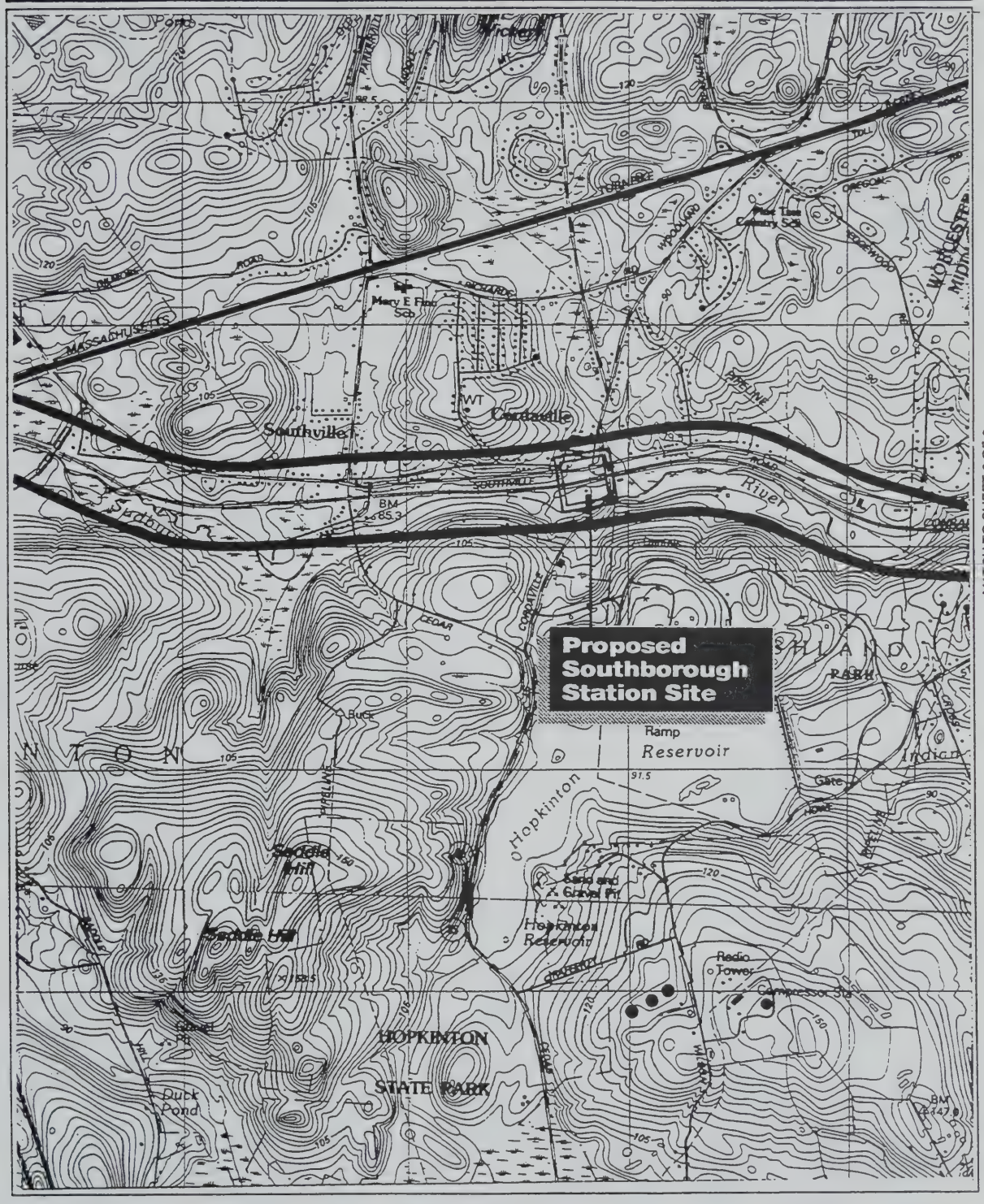
Project Location

Sheet 2 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts

MATCH TO SHEET 4 OF 8



MATCH TO SHEET 2 OF 8

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

Source: USGS
Marlborough, Milford Quadrangles

Project Location

Sheet 3 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

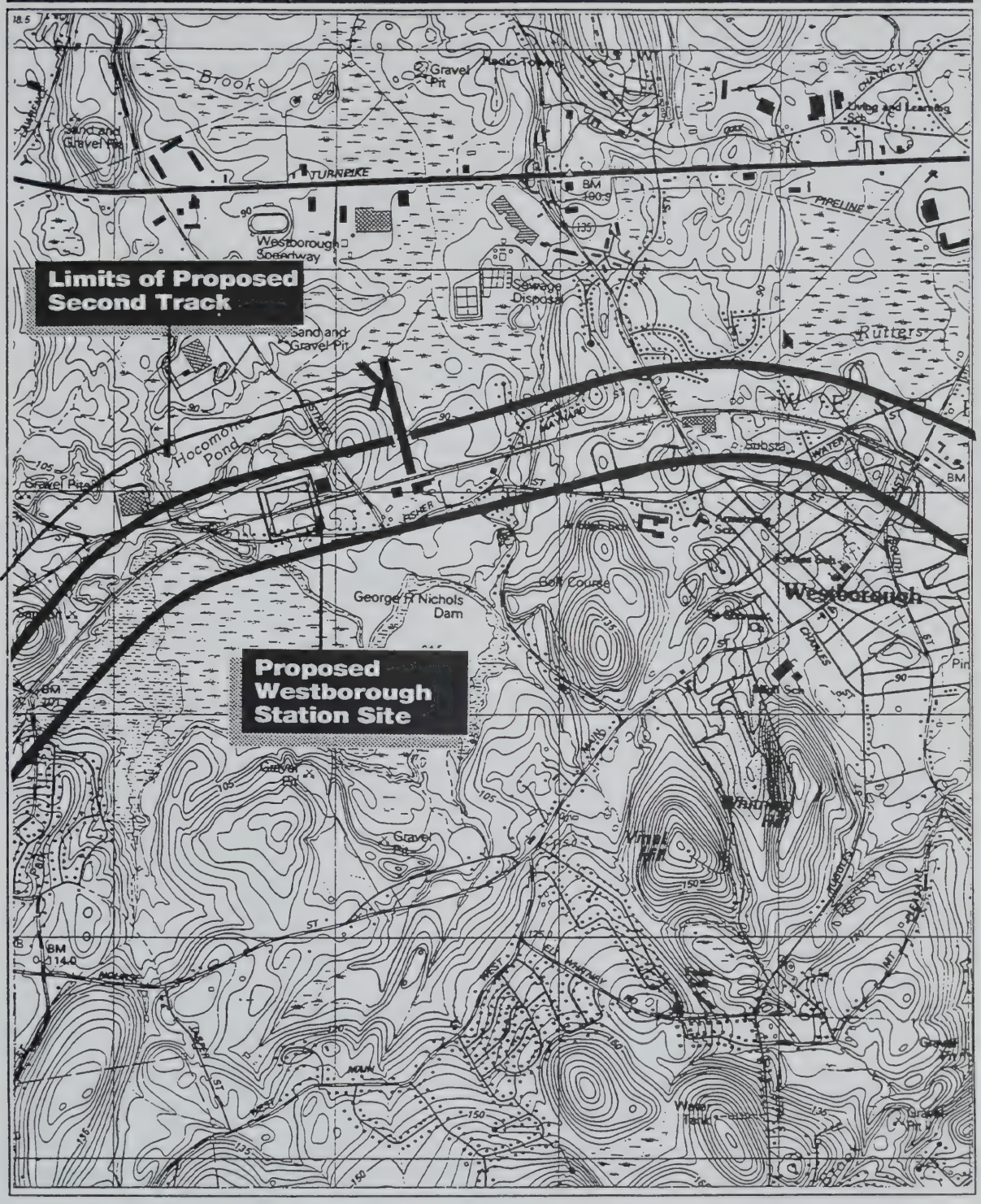
Source: USGS
Marlborough, Milford Quadrangles

Project Location

Sheet 4 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

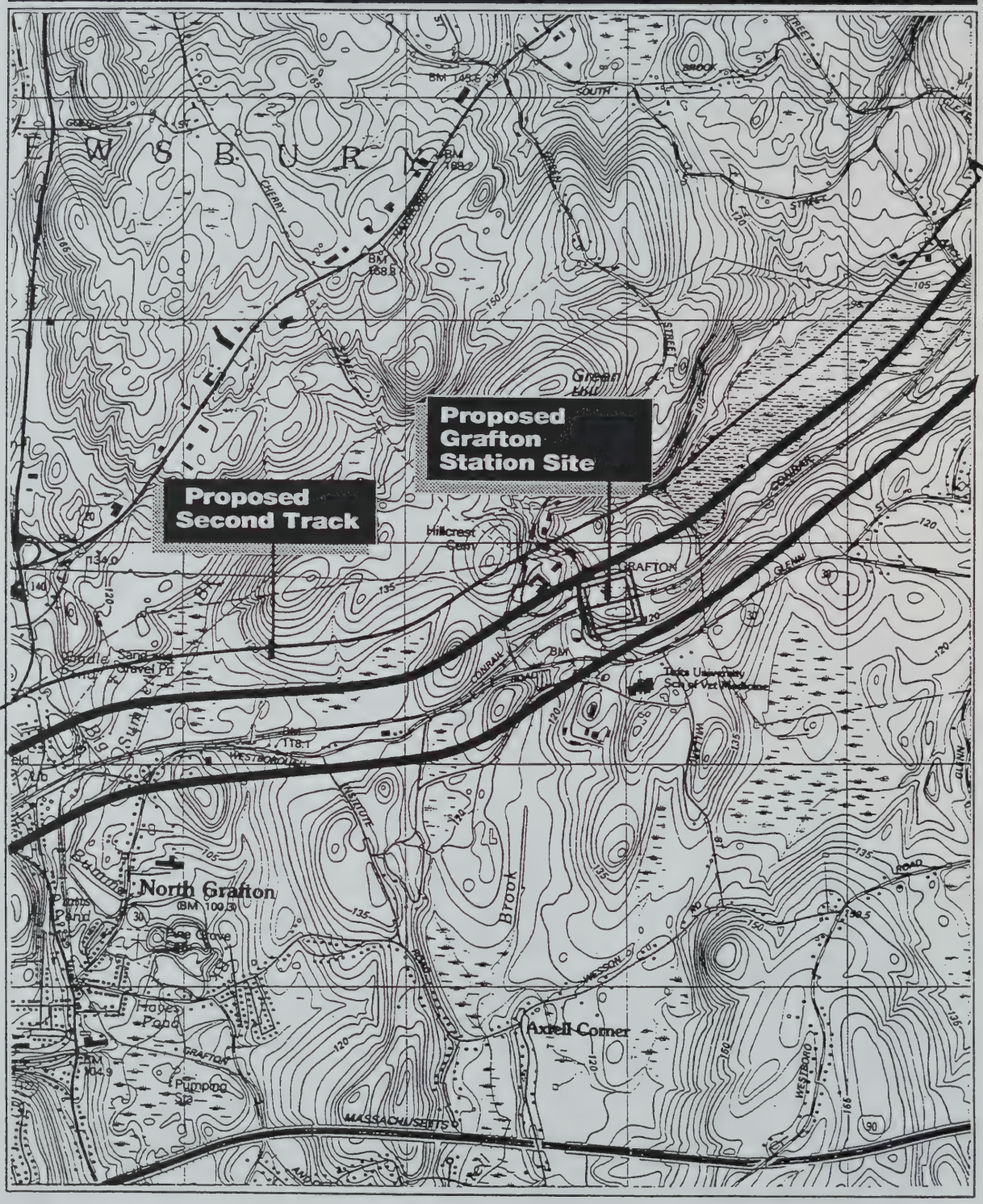
Source: USGS
Marlborough, Milford Quadrangles

Project Location

Sheet 5 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

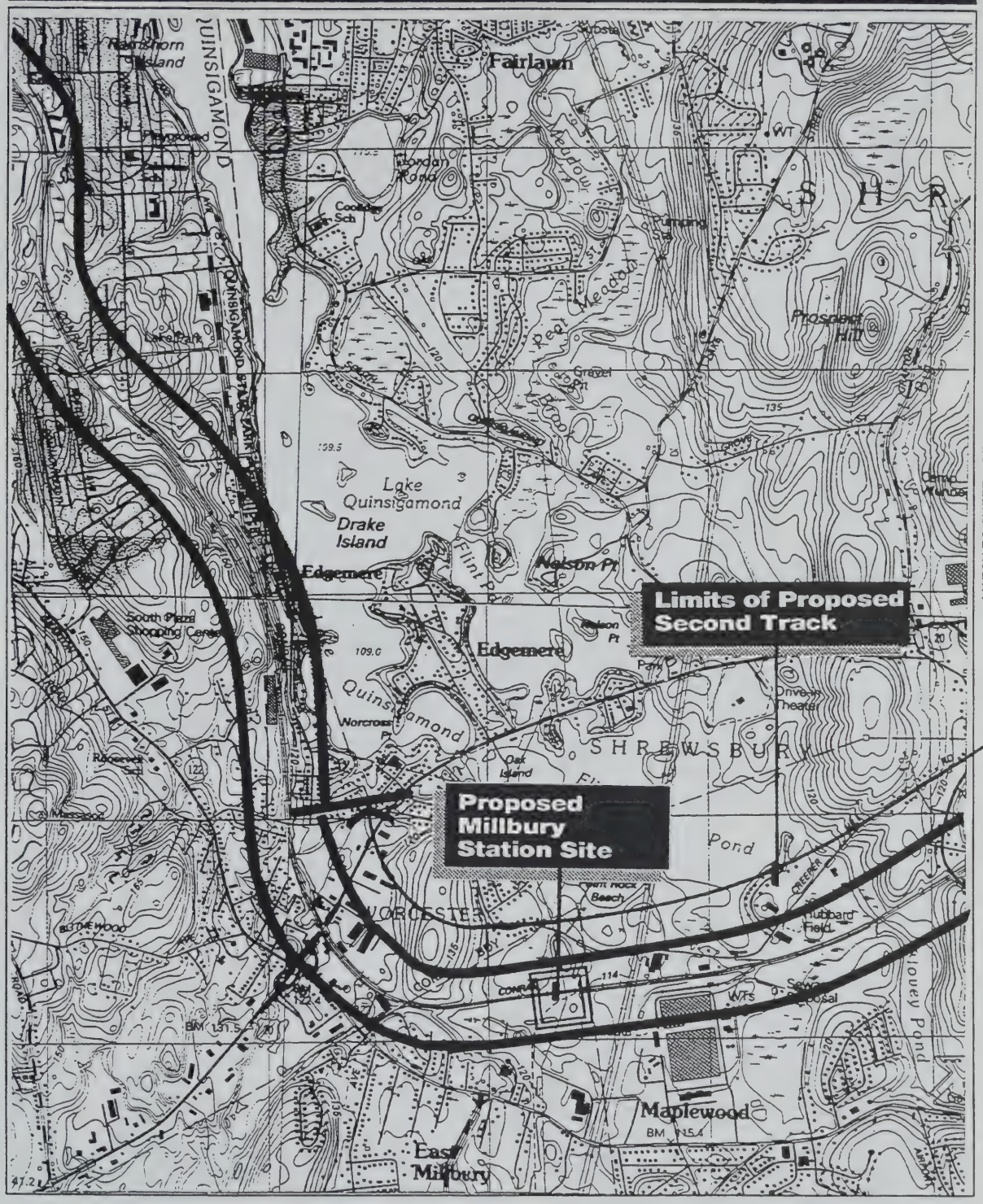
Source: USGS
Marlborough, Milford Quadrangles

Project Location

Sheet 6 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

Project Location

Sheet 7 of 8

Source: USGS
Worcester North, Worcester South, Marlborough, Milford Quadrangles

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts

Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 2000 Feet

0 2000

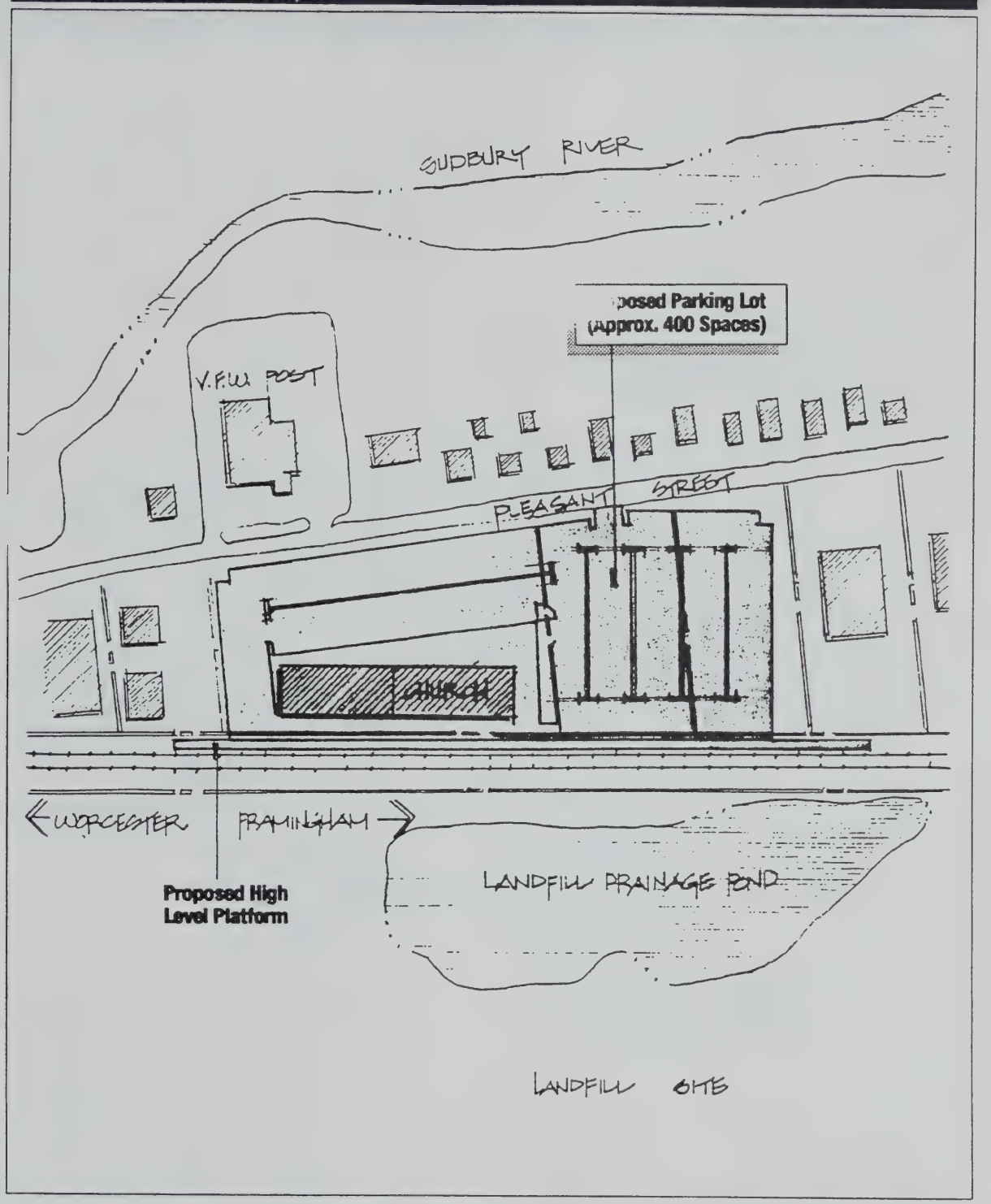
Source: USGS
Worcester North, Worcester South Quadrangles

Project Location

Sheet 8 of 8

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

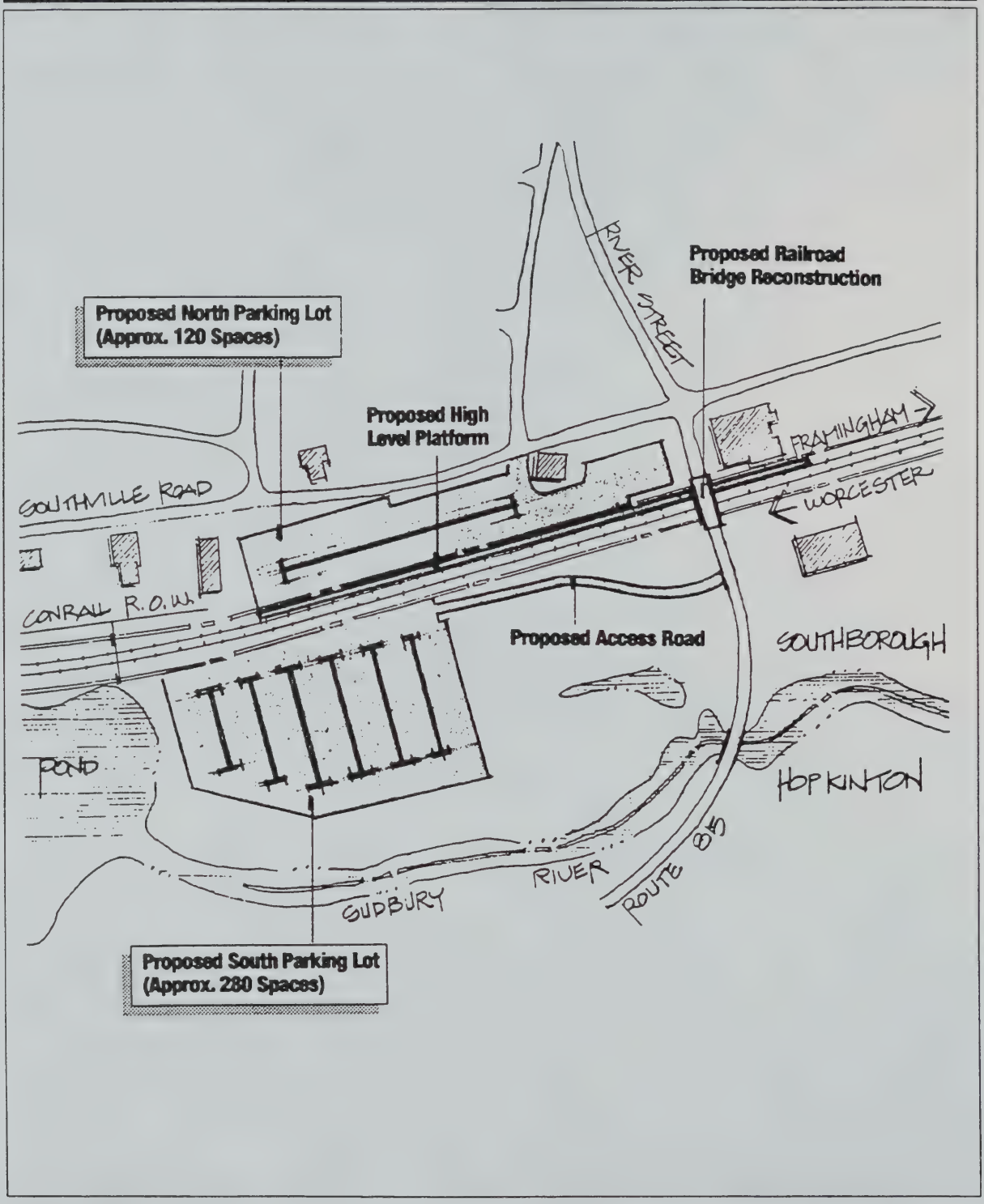
Approx. Scale: 1" = 200 Feet

0 200

Station Plan / Ashland Pleasant Street

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

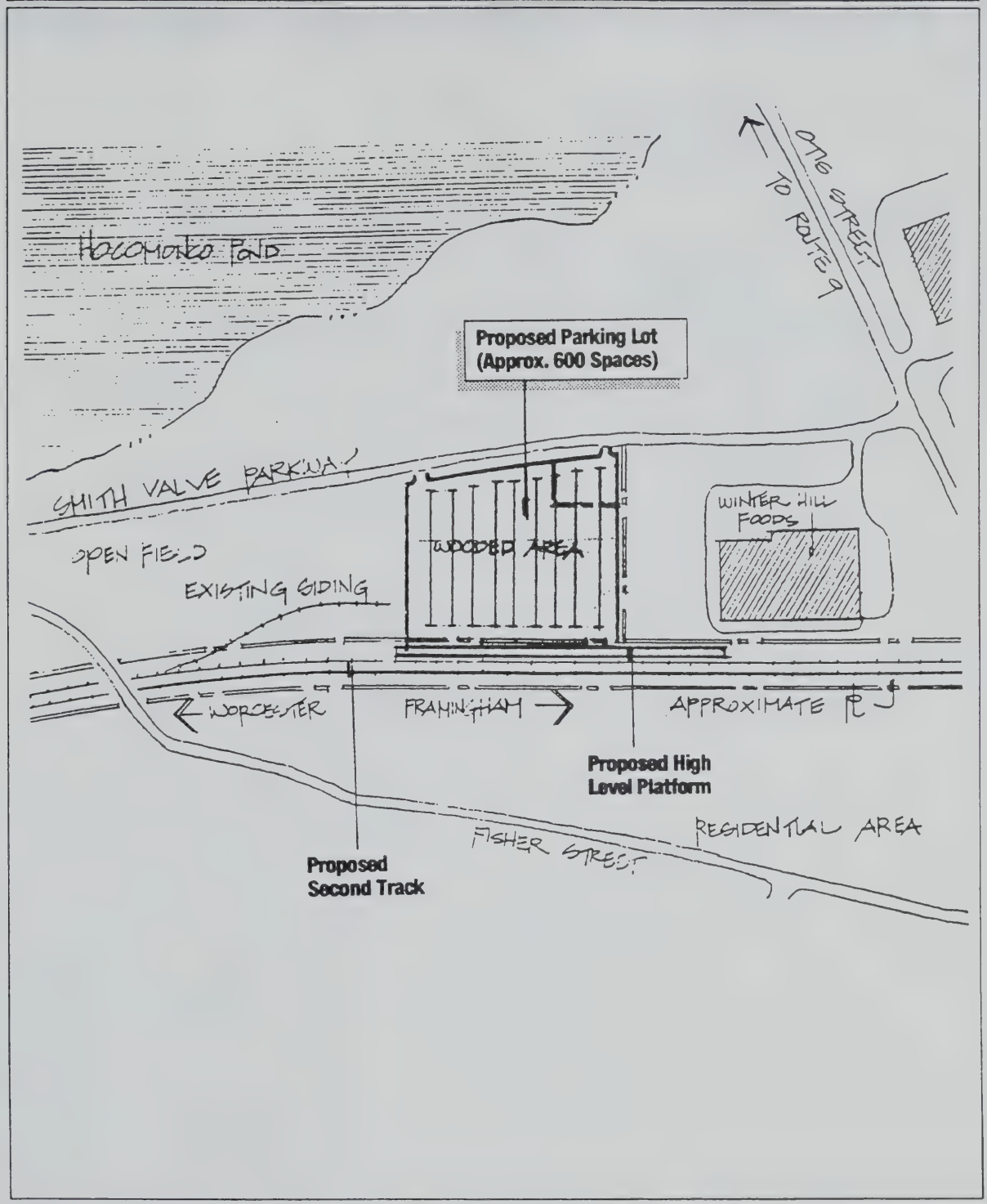
Approx. Scale: 1" = 200 Feet

0 200

Station Plan / Southborough Rte. 85/Southville Road

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



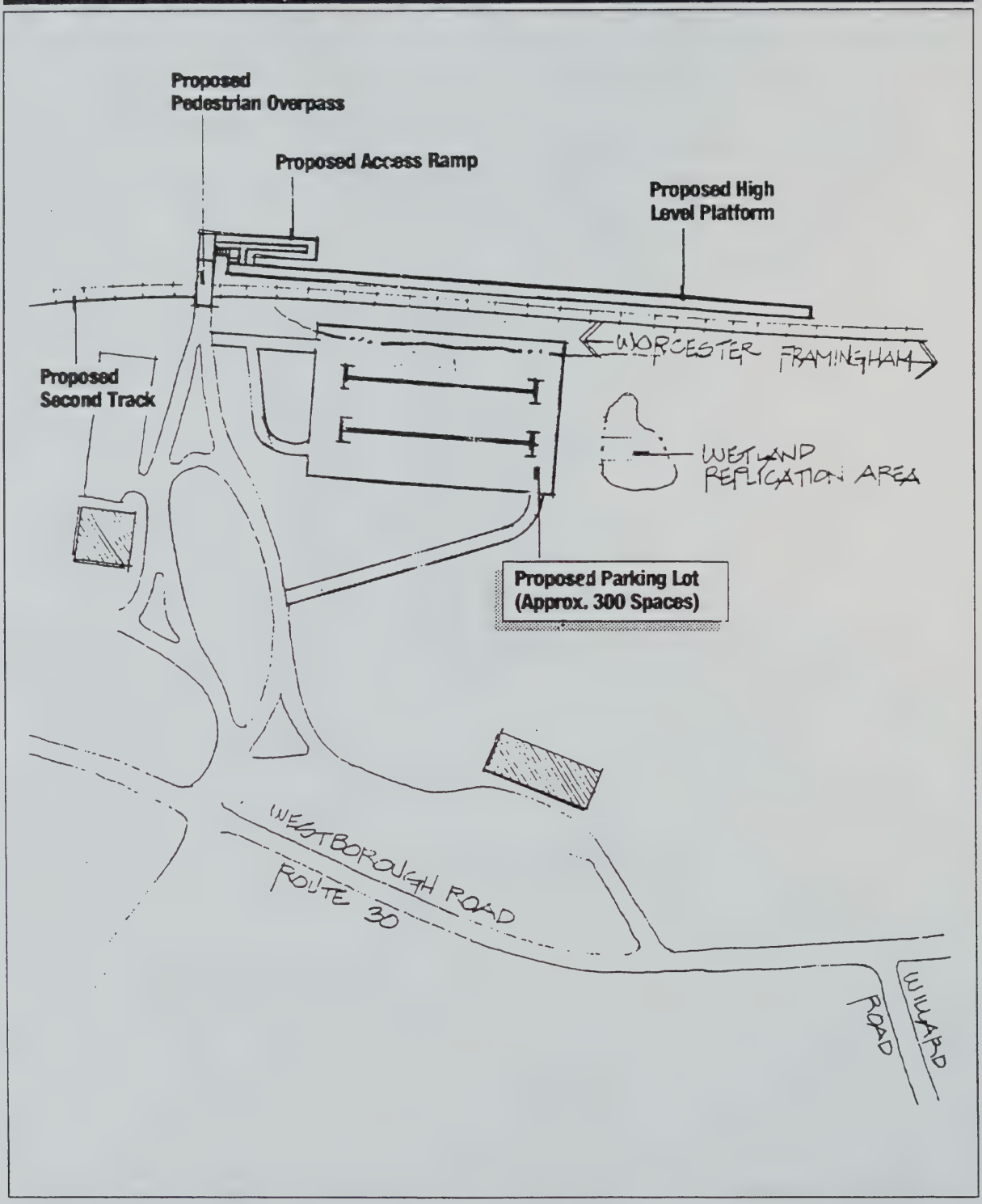
Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 400 Feet

0 400

Station Plan / Westborough
Smith Valley Pkwy./Rte. 9

Prepared By
EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts
Bay
Transportation
Authority

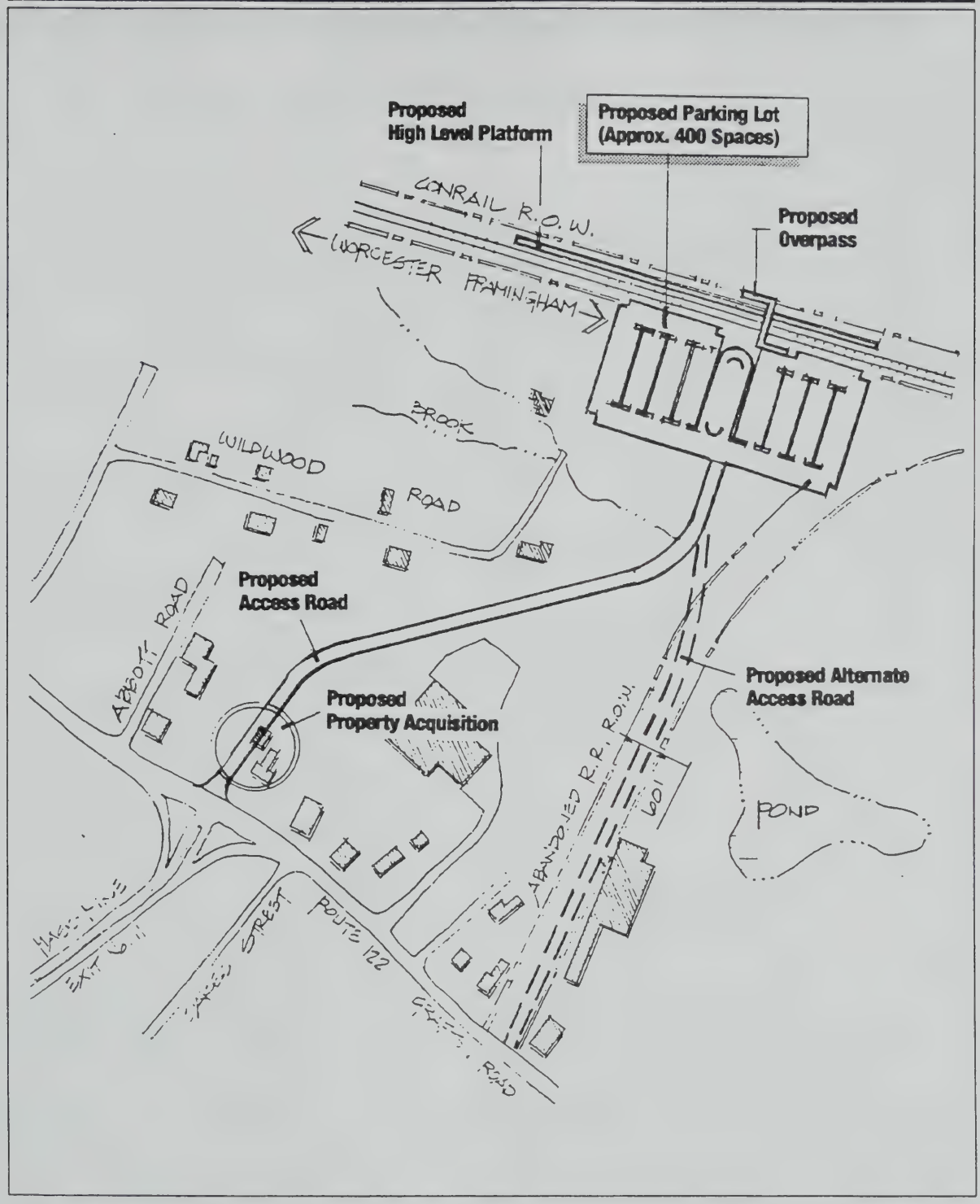
Approx. Scale: 1" = 200 Feet

0 200

Station Plan / Grafton
Tufts University/Biotech Park

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

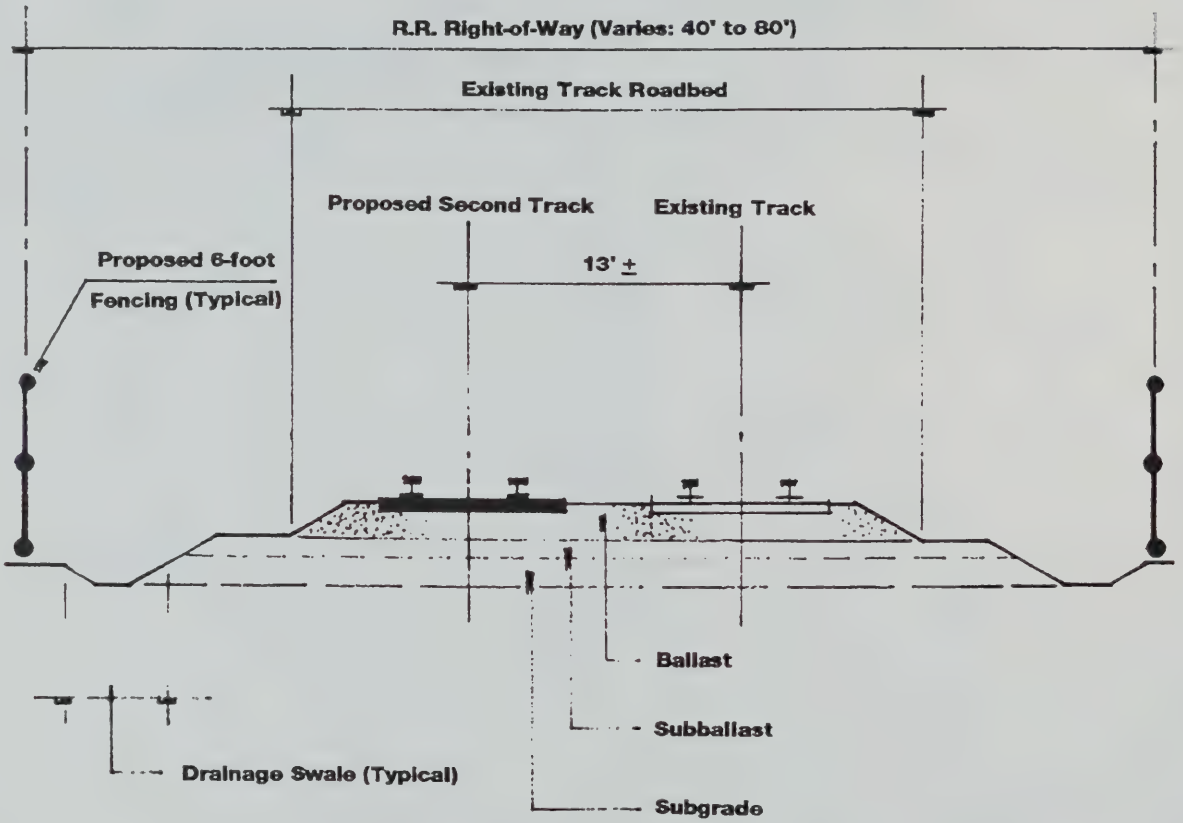
Approx. Scale: 1" = 200 Feet

0 200

Station Plan / Millbury
Mass Turnpike Exit 11/Rte . 122

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts



Massachusetts Bay Transportation Authority

Not to Scale

Typical Track Roadbed Cross Section

Figure 1

Prepared By:

EDWARDS AND KELCEY, INC.
Boston, Massachusetts

ENF CIRCULATION LIST
WORCESTER COMMUTER RAIL EXTENSION PROJECT

Secretary of Environmental Affairs
100 Cambridge Street, 20th floor
Boston, MA 02202
Attention: MEPA Unit

Department of Environmental Protection (DEP)
One Winter Street
Boston, MA 02108

Department of Environmental Protection
Division of Wetlands and Waterways
One Winter Street
Boston, MA 02108

Department of Environmental Protection
Division of Water Pollution Control
One Winter Street
Boston, MA 02108

DEP/Central Regional Office
75 Grove Street
Worcester, MA 01605

DEP/Central Regional Office
Division of Wetlands and Waterways
75 Grove Street
Worcester, MA 01605

DEP/NE Regional Office
10 Commerce Way
Woburn, MA 01801

Executive Office of Communities and
Development State Clearinghouse
100 Cambridge Street, Room #1803
Boston, MA 02202

Massachusetts Historical Commission
80 Boylston Street
Boston, MA 02116

Metropolitan Area Planning Council
60 Temple Place
Boston, MA 02111

Central Mass. Regional Planning Commission
340 Main Street, Suite 747
Worcester, MA 01608

MHD - District #3
403 Belmont Street
Worcester, MA 01064

MHD - District #4
519 Appleton Street
Arlington, MA 02174

Framingham Conservation Commission Town
Hall, Memorial Building
Framingham, MA 01701

Framingham Planning Board
Town Hall, Memorial Building
Framingham, MA 01701

Ashland Conservation Commission
Town Hall, 101 Main Street
Ashland, MA 01330

Ashland Planning Board
Town Hall, 101 Main Street
Ashland, MA 01330

Southborough Conservation Commission
Town House, 17 Common Street
Southborough, MA 01772-9109

Southborough Planning Board
Town House, 17 Common Street
Southborough, MA 01772-9109

Westborough Conservation Commission
Town Hall, 34 West Main Street
Westborough, MA 01581

Westborough Planning Board
Town Hall, 34 West Main Street
Westborough, MA 01581

ENF CIRCULATION LIST
WORCESTER COMMUTER RAIL EXTENSION PROJECT

Grafton Conservation Commission
Town Hall, 30 Providence Road
Grafton, MA 01519

Grafton Planning Board
Town Hall, 30 Providence Road
Grafton, MA 01519

Millbury Conservation Commission
Town Hall, 127 Elm Street
Millbury, MA 01527

Millbury Planning Board
Town Hall, 127 Elm Street
Millbury, MA 01527

Worcester Conservation Commission
City Hall, 455 Main Street
Worcester, MA 01608

Worcester Office of Planning and
Community Development
City Hall, 455 Main Street
Worcester, MA 01608

Massachusetts Water Resource Authority
100 First Avenue
Charlestown Navy Yard
Boston, MA 02129

Executive Office of
Transportation and Construction
10 Park Plaza, Room 3510
Boston, MA 02116-3969

Massachusetts Highway Department
10 Park Plaza, Room 4260
Boston, MA 02116

U.S. Environmental Protection Agency
Region 1, Environmental Review Office
JFK Federal Building
Boston, MA 02203

U.S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254
Attn: Regulatory Branch

U.S. Department of the Interior
Fish and Wildlife Service, NE Region
22 Bridge Street, Suite 400
Concord, NH 03301-4901

Sudbury Valley Trustees, Inc.
P.O. Box 7, 215 Boston Post Road
Wayland, MA 01778

Worcester Area Chamber of Commerce
33 Waldo Street
Worcester, MA 01608-1581

Worcester Regional Transit Authority
287 Grove Street
Worcester, MA 01605

Dr. Franklin M. Loew
Tufts University School of Veterinary Medicine
200 Westboro Road
North Grafton, MA 01536

MEPA CERTIFICATE ESTABLISHING A SPECIAL PROCEDURE FOR A MAJOR AND COMPLICATED PROJECT, OCTOBER 8, 1992

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
GOVERNOR

ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR

SUSAN F. TIERNEY
SECRETARY

(617) 727-9

October 8, 1992

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ESTABLISHING A SPECIAL PROCEDURE FOR A MAJOR AND COMPLICATED PROJECT

PROJECT NAME	: Worcester Commuter Rail Extension Project
PROJECT LOCATION	: Framingham, Ashland, Southborough, Westborough, Grafton, Millbury, and Worcester
EOEA NUMBER	: 9154
PROJECT PROPONENT	: Mass Bay Transportation Authority
DATE NOTICED IN MONITOR	: August 24, 1992

Project Description

The Massachusetts Bay Transportation Authority (MBTA) proposes to extend commuter rail service from Boston to Worcester. This requires the re-establishment of a commuter rail corridor between Framingham and Worcester, a route which was discontinued in 1975 due to low ridership. Commencement of project construction is planned for 1993, with a completion date in mid-1995.

Train stations at intermediate locations have been proposed in Ashland, Southborough, Westborough, Grafton, and Millbury. The MBTA is also exploring the possibility of a regional station in the vicinity of I-90/Route 495 interchanges. These intermediate stations will include new high level platforms, rail overpasses or underpasses, and parking areas that will be sized to accommodate between 300 and 600 spaces, depending on location. The 23 mile extension of service will also necessitate the construction of 11 miles on new track. The proposed commuter rail service is expected to serve 2,500 patrons per day.

Major and Complicated Designation

At the September 15, 1992 scoping session, it was requested that the project be designated Major and Complicated. Taking into consideration the information in ENF and the agency and public comments, the MBTA and I concur that a project-specific procedure, as provided for in the Major and Complicated regulations in 301 CMR 11.12, would enhance the EIR review of this project. Therefore, I am hereby establishing a Special Procedure that is suitable for the proposed project.

It appears that the time required for the full evaluation of environmental impacts at the proposed rail station sites may vary. As the project crystallizes and the station designs evolve, there may be advantages to accelerating or protracting the review of certain elements of the project. Consequently, the flexibility afforded by the Major and Complicated designation, in 301 CMR 11.12 (2), will allow adjustments to be made in this review process, where appropriate, as more information is developed.

The Major and Complicated designation may also prove to be useful in linking the review of the intermediate stations with the review of the Worcester station. The regulations include provisions for a project with different or multiple proponents. Therefore, even though the proposed rehabilitation of Union Station in Worcester has not been brought into the MEPA review process yet, it would be possible under a Major and Complicated review, to modify this special procedure to include the Worcester station at a later date, if there were apparent advantages of a combined review.

In designating this a Major and Complicated project, I envision a review process that provides a comprehensive DEIR and the opportunity for the review of separate FEIRs for discrete elements of the project. This modified review process should prove to be more accommodating, given the level of complexity associated with the project and the state regulatory requirements. At the same time, it will not compromise the EIR review process objectives. Finally, I believe that early commencement of this project, or portions of the project, may have positive impacts on air quality, by reducing the number of vehicle miles of travel in the Commonwealth, and by reducing the demand on parking in congested urban areas.

Special Procedure

The environmental documents under this Special Procedure will include, at a minimum, a Draft and Final Environmental Impact Report. A scope for the EIR will be issued in a separate certificate. The Draft EIR will be expected to evaluate the entire project and its discrete components. The Draft should be submitted for review at about the 30% design stage. The FEIR submittal(s) will be expected at about the 60% design stage.

This Special Procedure will allow the MBTA discretion in terms of timing of the filing of the Final EIR document or documents. For example, if it appears that there is an opportunity to proceed with certain elements of the project, but not the entire project, then the MBTA may opt to file an FEIR for the element(s) where the analyses are complete. Should the MBTA propose to submit separate FEIRs, the Secretary and the CAC should be notified, as soon after the decision is made as possible. On the other hand, if all of the project is complete, then it would be possible to submit a single FEIR on the entire project which responds to the comments and the Secretary's Certificate on the DEIR.

In the event that the proponent has an interest in proceeding with an activity that has not been clearly accounted for here, clarification from the MEPA Unit will be needed. Should there be a question about the impacts of that activity, the request may be treated as a Project Change, pursuant to 301 CMR 11.17.

Citizens Advisory Committee

Special provisions for Major and Complicated projects allow the Secretary to establish a Citizens Advisory Committee (CAC) to assist the Secretary in the review and evaluation of the environmental impacts of the project. The MBTA, with the assistance of the affected communities, has already established a task force in each community. To foster coordination between the task forces and the CAC, a member of each task force should be on the CAC. Each community should also be represented by two additional CAC members that will be selected from the private citizenry, or elected or appointed officials. At least one additional representative of the community should be chosen to serve as an alternate to the CAC. The formation of the CAC for this project will be announced in the *Environmental Monitor* and nominations will be solicited in conjunction with the notice of

formation of the CAC.

The review of all reports shall be in accordance with the Review Procedures for Draft EIRs and Final EIRs in 301 CMR 11.08 and 11.09. The public comment period on the DEIR will be extended to 60 days, as provided in those regulations. In addition, the MBTA can and should continue to work with the local task forces as deemed appropriate. The CAC should be convened shortly after its formation and shall establish its own schedule of meetings. A representative of the MEPA Unit shall be attend the first meeting of the CAC to provide information on the role of the CAC directly to its members. The MBTA shall provide administrative support to the CAC.

The CAC will be entitled to meet monthly with the MBTA, and shall be kept abreast of progress on the EIR. The CAC should be furnished draft documents, when possible. The CAC may direct questions concerning the review process to either the MBTA or to the Secretary.

The Draft EIR shall be submitted to the CAC at least one month prior to the submission to the Secretary for notice in the *Environmental Monitor*. The CAC may request changes prior to submission to the Secretary, and may submit comments to the Secretary when the Draft is submitted. The CAC shall where possible try to reach consensus. If consensus is unattainable, it shall present its diverse views. Such comments shall be considered part of the DEIR and shall be furnished to persons requesting copies of the Draft.

When the FEIR(s) is submitted, the CAC may submit comments. After the review process is completed, the CAC may consult with the Secretary to determine its role, if any, in any future actions on the project.

Oct. 8 1992
Date

Susan F. Tierney
Susan F. Tierney, Secretary

OCT 13 1992
Date

John Haley
General Manager
The Mass Bay Transportation Authority

SFT/NB/JD/jd/nb

MEPA CERTIFICATE ON THE ENF, OCTOBER 22, 1992

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
GOVERNOR

ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR

SUSAN F. TIERNEY
SECRETARY

(617) 727-9800

FILE COPY

October 22, 1992

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Worcester Commuter Rail Extension
PROJECT LOCATION	: Framingham to Worcester
EOEA NUMBER	: 9154
PROJECT PROPONENT	: MBTA
DATE NOTICED IN MONITOR	: August 24, 1992

Pursuant to the Massachusetts Environmental Policy Act (G. L., c. 30, s. 61-62H) and Sections 11.04 and 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that the above project requires the preparation of an Environmental Impact Report.

The MBTA proposes to extend commuter rail service from Boston to Worcester. This proposal re-establishes commuter rail service between Framingham, which is currently the end of the line, and Worcester. This route was discontinued in 1975 due to low ridership. The MBTA proposes commencement of project construction in 1993, with a completion date in mid-1995.

Train stations at intermediate locations have been proposed in Ashland, Southborough, Westborough, Grafton, and Millbury. The MBTA is also exploring the possibility of a regional station in the vicinity of the I-90/Route 495 interchange. These intermediate stations will include new high level platforms, rail overpasses or underpasses, and parking areas that will be sized to accommodate between 300 and 600 vehicles, depending on location. The project will also necessitate the construction of 11 miles of new track. The MBTA currently estimates that the proposed extension will serve 2,500 patrons per day.

The project has been designated "Major and Complicated" pursuant to the MEPA Regulations at 301 CMR 11.12, and a special procedure for the Environmental Impact review has been established. A separate Certificate dated October 8, 1992 details the review procedures to be followed for this project. A Citizens Advisory Committee (CAC) will also be established to assist the Secretary in the review and evaluation of the environmental impacts of the project.

100% RECYCLED PAPER

In short, the special procedure calls for the MBTA to file, at a minimum, a Draft and Final EIR. The Draft should be submitted for review at about the 30% design stage. The Final submittal(s) will be expected at about the 60% design stage. The special procedure allows the MBTA discretion in terms of the timing of the filing of the FEIR document or documents. For example, if it appears that there is an opportunity to proceed with certain elements of the project, but not the entire project, the MBTA may opt to file a FEIR for the element(s) of the project where the analysis is complete. It is also possible to submit a single FEIR if all project analysis is complete. This Certificate contains the Scope for the required analysis.

S C O P E

I. Summary Description - Corridor and Station

The EIR should present a brief overview of the project, including a history of the service and a discussion of its termination. The project overview should discuss the populations proposed to be served by the project. The project overview should discuss the railroad rights of way available, and the proposed location of stations.

II. Needs Analysis, Identification of Service Area, Alternative Service Proposals

The EIR should contain a thorough analysis of the demographics needed for successful implementation and re-established commuter rail service. Commuter rail service was discontinued in 1975. What conditions have changed that would indicate that the re-establishment of service would be successful? The EIR should contain a needs analysis that identifies the service population and demonstrates the viability of the service.

The EIR should identify the region and individual communities served by the proposed project. This should be population based and should use available journey to work data.

III. Financial Analysis

A number of commenters, most notably the comment from the Board of Selectmen in the Town of Southborough, have asked that a financial assessment of the project be included in the EIR. This information should be developed within the context of the EIR, provided that there is consensus among the members of the Citizen's Advisory Committee (CAC) that such an analysis would be germane to its interests and responsibilities, and provided that the CAC prepares a brief outline of the issues that need to be addressed for review and approval of the Secretary for inclusion in this scope.

IV. Alternatives Analyses

The alternatives analyses should evaluate and compare: 1)alternatives to commuter rail service, including the no-build alternative; 2) alternative station options; 3) alternative station siting; and 4) alternative station layouts and designs in order to fully investigate the range of opportunities to avoid or minimize damage to the environment.

1) The analysis of alternative transit modes should address the comments, such as those of the Sudbury Valley Trustees, which ask for an understanding of the selection of commuter rail expansion instead of other transit mode options. The analysis should include a discussion of the relative costs of the alternative modes. The environmental impacts and benefits of the various mode alternatives, such as impacts to air quality, should compared and discussed in this evaluation.

2) The alternative station options study provides an opportunity to identify interrelationships between the stations in terms of parking and traffic impacts. One approach would be to treat a given station as No-Build to assess how much additional capacity would be necessary at an abutting station. In the analysis, consideration should be given to a variety of station options to identify the optimal number of stations to meet the perceived ridership demand. One objective of this study is to answer the concern that if a certain station is not developed, or if it is not developed to its full potential, then other stations will be required to absorb the added ridership demand. Would such demead shift to another station, or would it not be served (and shift perhaps to other modes)? If the

development of a regional station is deferred, will any of the intermediate stations become a regional station *de facto*?

3) The analysis of alternative station siting should be done in response to preliminary concerns that some of the station sites will have unacceptable or very significant impacts.

The analysis should include a discussion of the sites proposed for stations. The EIR should identify the sites considered and should discuss what criteria the MBTA used to choose the locations identified in the ENF for station locations. Some of this analysis is contained in MBTA's Commuter Rail Extension Feasibility Analysis dated January 1990 and can be summarized in the EIR.

The EIR should also describe how the MBTA estimated ridership at the various site locations and how the number of parking spaces at each site was established.

4) Suggestions for this alternatives analysis are also provided in Section V of this scope.

V. Environmental Impact Analyses

The analysis of the environmental impacts associated with this project should generally include the information outlined by topic in this section of the scope. This analysis should include both a station-by-station analysis of the impacts and a comprehensive understanding of the overall corridor and right-of-way impacts.

Wetlands and Drainage

The EIR should analyze the impact of the project on wetland resources. The MBTA's plans for permitting work in areas subject to the Wetlands Protection Act should be detailed. The EIR should identify major wetlands areas to be impacted by either necessary upgrading work in the corridor, or work in the right of way. Particular attention should be given to Areas of Critical Environmental Concern. The MBTA should consider whether the project meets the performance standards outlined in the Wetlands Protection Act, or whether a variance will be necessary. If a variance will be required, the EIR should contain the necessary

analysis for consideration of a variance. Detailed site assessments of wetlands impacts will be expected in the station specific evaluations as scoped below. More generalized discussions of wetland impacts will be expected in the overall corridor analysis.

The resource area boundaries and the associated buffer zones and the 100-year flood elevations should be clearly identified on a plan at a scale of not greater than 1" = 100'. The wetlands that have been delineated in the field should be surveyed, mapped and placed on the plans indicating easily identifiable bench marks in the field. Wetland resource areas should be characterized according to MGL C.131, s.40, identified on the plan and accompanied by EIR text. The EIR must address itself to the significance of the resource values of each wetland area including: public and private water supplies, flood control, storm damage prevention, prevention of pollution and protection of fisheries and of wildlife habitat. The text should explain whether the local conservation commission has accepted the boundaries and identify any disputed areas. Proposed activities, including construction mitigation, erosion and sedimentation control, phased construction, and proposed crossing plans and drainage directly or indirectly (i.e., overland flow) into wetland areas must be evaluated. The locations and distances of retention/detention basins to wetland resource areas and the expected water quality emanating from said basins should be evaluated. This analysis should address the predicted final receiving waterbodies' current and expected post-development water quality. This analysis must consider potential impacts during construction and following project completion.

The Commonwealth has endorsed a policy that seeks avoidance of wetlands alteration wherever possible. Where wetland impacts are unavoidable, the EIR must propose acceptable mitigation measures to protect the resource areas, and minimize short and long term impacts to the greatest extent possible. This analysis should include a discussion of predicted changes in hydrology, water temperature, vegetation and wildlife habitat. The proponent is advised to consult with DEP-Wetlands in order to arrive at a workable and acceptable mitigation plan. Applicable federal permitting should be discussed as well as any local wetland by-laws and/or protection zones.

The DEP-Technical Services Branch should be consulted as to the necessity for and requirements of a National Pollutant Discharge Elimination System Permit (NPDES). Pre-development and post-development runoff should be calculated for the 10 and 100

year storm. The site plan should indicate the locations of retention/detention basins, these basins should be sized for the 100 year storm event (thus ensuring that adequate land is available). The expected water quality emanating from these basins should be explained. It should be demonstrated that the proposed drainage system meets best management practices for the discharge areas beyond the site.

Historic/Archaeological

The EIR should identify areas in the rail corridor at proposed station sites where historic or archaeological resources may be impacted. As noted in the comments of the Massachusetts Historical Commission, the project is within and adjacent to areas that contain p on the National Register of Historic Places. In addition, there are numerous properties that are included in the Inventory that are eligible for listing on the National Register. The project area also includes multiple historically and architecturally properties that have not yet been formally identified and evaluated for National Register eligibility.

The MHC has requested that the MBTA undertake a reconnaissance cultural resources survey for the proposed project. The MBTA should conduct such a survey as a part of the EIR process. The MHC has offered to work directly with the MBTA in developing an appropriate scope for the historic and archaeological survey.

Traffic

The traffic study should analyze both the construction and the operational traffic impacts relating to the project. It should conform with the EIR/EIS Guidelines for Submission, Traffic Analysis Section, Environmental Monitor, October 24, 1988. In addition, the analysis should evaluate the AM and PM peaks, and the hour when traffic generated by the facility is greatest (if the highest hour traffic volume generated differs from the AM and PM peak).

The traffic study areas for all station locations should focus on the intersections and roadway links where ridership tripmaking is anticipated to be 10 percent or greater and on those areas highlighted in the station specific requirements below. High percentage roadway links should be traced back towards ridership origination points, and the limits of the study should be defined as the remotest intersection, where 10 percent or more of the trips are project-generated.

Ridership projections, trip types and vehicle occupancy rates, origination and assignment of trips, and peak tripmaking estimates must be provided in the traffic analysis. The data and algorithms used to compute these assumptions should be explained and the reliability of the estimates should be discussed.

Noise

The EIR must provide a noise impact assessment that includes a pure tone analysis, at the property boundary and at the nearest residence. The EIR should identify sensitive receptors along the right of way and should compare the existing and projected noise levels expected after project implementation. Ambient noise should be monitored and compared with the noise generated by the proposed facilities. Both daytime and nighttime noise impacts should be evaluated. The EIR should provide the differential noise impact levels for the locomotive fleet, based on age, and noise levels for train speeds. In addition, the EIR should explain the noise metrics and the assumptions used in the analysis. Manufacturer's data on equipment noise should be presented. The analysis should also quantify impacts with and without mitigation. Finally, supporting documentation must be submitted to substantiate the noise reduction or attenuation levels that will be achieved through mitigation.

Further, layover area noise impacts should be analyzed. The horn blowing requirements should be explained and areas where horn blowing is a routine event should be shown on a route map.

Fencing

Fencing of the rail corridor was discussed at the consultation session. The EIR should discuss the proposed fencing plans for the corridor and discuss both the benefits (such as safety and security) and the problems associated with fencing proposals. Concern has been raised in some of the comments on the impact to wildlife movements, in particular the comments of Southborough and Grafton.

Construction Impacts

The EIR must provide a thoughtful evaluation of the construction-related impacts of the project, including erosion and sedimentation, blasting (noise and vibration impacts) and the loss of vegetation in wildlife resource areas. The objective of the analysis should be to identify build out alternatives and

temporal phasing opportunities to reduce the areal extent of single clearings, to minimize cuts and fills or significant changes in the existing topography, and to optimize site recovery periods and to minimize construction related impacts on nearby residents or other sensitive receptors.

VI. Right-of-Way, Corridor Wide Impacts

The EIR should examine the common elements of the project on a corridor wide basis, it should identify the major areas of impact, and it should evaluate appropriate mitigation measures. These areas of impact include, but are not limited to, the following:

Right of Way Improvements Required - The EIR should identify the existing rights of way conditions and outline the improvements needed to re-institute service.

Holdover Areas - The EIR should identify holdover areas and evaluate noise impacts and air quality impacts at these areas.

Long Range Growth Impacts - The EIR should provide an analysis of economic/secondary development impacts that may be associated with a decision to locate a station at a particular site. The EIR should also consider the regional socio-economic impacts related to re-instituting the rail service.

VI. Railroad Station Issues

Each of the proposed stations may have impacts unique to that location. This section of the scope, which is based on written comments and the discussions at the scoping session, identifies the site specific issues that need to be evaluated to gain an understanding of the potential environmental damage and the opportunities to avoid or minimize that damage.

Generic Site Design - The EIR should identify design standards that will used at the individual station locations. This should included, but not be limited to: lighting, platforms, the necessity of gauntlet platforms, overpasses, underpasses and pedestrian movement. The EIR should also discuss design issues as related to consistency with local plans, policies, community character and aesthetics.

Operating Plans - The EIR should identify the operating plans for the proposed service, including frequency of daily operations, proposed headways, peak and off peak operations. The EIR should also thoroughly analyze the capacity of the line to accommodate the proposed MBTA trains, AMTRAK trains and Conrail's freight operations. Improvements needed to accommodate this service, such as passing sidings or additional rights of way, should be clearly identified.

Ashland

Parking - The 400 space parking lot proposed for the Pleasant Street station site is smaller than envisioned in the Commuter Rail Extension Feasibility Study, January 1990. On what basis was the lot scaled back? If ridership projections anticipate higher demands for parking, where will it be accommodated?

Traffic - The traffic study should adhere to the requirements in the generic sections of the scope. The study area should generally extend to Pleasant Street, Oak Hill Road, Oak Street, Cordaville Road, and Southview Road. Key intersections within those roadways should be analyzed in terms of safety issues and traffic operations. The following intersections should be included: station driveways onto Pleasant Street, Cordaville Road/High Street/Pleasant Street, Pleasant Street/Main Street, Pleasant Street/Tilton Avenue/Summer Street and Pleasant Street/High Street.

The traffic study should also discuss plans for the two at-grade rail crossings in Ashland.

Drainage - The drainage study should consider the potential effects of any changes in the site drainage attributable to this project, on the Pleasant Street area, and the Nyanza Superfund site (identified as "Landfill Site" on Station Plans in ENF).

Impact on the Built Environment - The proposed site is now occupied by the Latter Rain Christian Fellowship Church with associated parking. Abutters on the same site of Pleasant Street are industrial warehouse facilities. On the opposite side of Pleasant Street, single family residential homes redefine the character of the area. Given that the station is in a transition area, the EIR should consider how this station can tie together the mix of uses by means of layout, design, etc. For example, a commenter has identified a need for sidewalks on Pleasant Street, between Metcalf Avenue and High Street. What conflicts with the church will be created by the proposed station? Is

there any evidence of a relationship between this site and the Nyanza site? Explain.

Southborough

Parking - The relationship between ridership demand and parking lot sizing should be analyzed and explained. The proposed parking lots' dimensions, layouts, and designs should be considered for opportunities to reduce the intrusive effects on the resources in the area. In particular, from the Station Plan in the ENF, it appears that the 120 space North Parking Lot will change the rural character of that area; the lot nearly circumscribes a "quaint" General Store. Furthermore, the 280 space South Parking Lot is shown to be less than 50 feet from a Pond that is tributary to the Sudbury River and less than 100 feet from the Sudbury River.

Traffic - The traffic study area suggested extends from Southville Road, Route 85, Central Street, and Woodland Road. It includes, at least, the intersections of Southville Road/site access, Route 85/site access, Southville Road/Route 85, Woodland Road/Route 85, and Route 85/Route 9 ramps.

This section should explain the proposed railroad bridge reconstruction. The concern that the bridge design should be compatible with the character of the area should be addressed.

Wetlands and Drainage - The objective of the wetlands impact analysis should be to develop a site layout and drainage design that eliminates and avoids impacts to the Sudbury River and trout hatchery nearby.

Impact on the Built Environment - According to comments, the site is subject to the standards and conditions of the Village Business zoning district. The EIR should discuss the layout and design of the facilities in terms of these zoning requirements.

Westborough

Parking - The relationship between ridership demand and parking lot sizing should be analyzed and explained.

Traffic - The traffic study area should cover the impacts on Maynard Street, Fisher Street, Glen Street, Gleason Street, Mill

Road, Otis Street, Walnut Street and Arch Street. At a minimum, the following intersections should be studied for safety and operational limitations: Smith Valve Parkway/site driveways, Otis Street/Smith Valve Parkway, Otis Street/ Route 9, Fisher Street/Maynard Street, Arch Street/Glen Street, Arch Street/Fisher Street, Gleason Street/Fisher Street, and Mill Road/Fisher Street.

This section of the EIR should also consider modifications to the key traffic routes to discourage the use of rural and residential streets. The EIR should also consider the impact on bridges which may require reconstruction and rehabilitation, including those at East Main Street, Water Street, Maynard Street, Arch Street, and Fisher Street.

Wetlands and Drainage - The relationship of this project to wetlands needs to be clarified. Drainage towards the Hocomonco Pond or Suasco Reservoir should be analyzed for changes in quality and volume of the stormwater discharges toward these resource areas. Any relationship between site runoff and the municipal groundwater supply should also be evaluated.

Impact on Built Environment - The impact of the project on an existing playing field should be assessed. The potential for contamination of the site from a former creosote treatment plant should be investigated.

Grafton

Parking - The relationship between ridership demand and parking lot sizing should be analyzed and explained. Alternatives to the proposed parking lot, including alternative sites (such as the one suggested by the Grafton Conservation Commission: west of Pine Street and north of Route 30), dimensional options, and layout options must be evaluated thoroughly for opportunities to avoid wetlands impacts and the requirement for a variance of the Wetlands Protection Act.

Traffic - Safety problems and traffic operations should be analyzed at the following intersections: Route 30 and the primary accessways into the station site, Route 140/Route 30/East Street, North Main Street/Bridge Street/ Bridge Street/Worcester Street, Worcester Street/North Main Street, and Westborough Road/Shrewsbury Street (Route 140). Requisite improvements to the Pine Street Bridge should be explained.

Wetlands and Drainage - This section of the EIR must address the regulatory issues relating to a variance of the Wetlands Protection Act and to 401 Certification, unless redesign of the parking and station facilities reduces the wetlands impacts below those programs' regulatory thresholds. Any relationship between site runoff and the municipal groundwater supply should also be investigated.

Impact on Built Environment - Relationships between this project, Tufts University, and the proposed Grafton Biotechnology Research and Manufacturing Park should be discussed.

Millbury

Parking - The relationship between ridership demand and parking lot sizing should be analyzed and explained. Alternative parking lot siting has been proposed to allow access from Route 20. This plan and the ENF plan should be analyzed at a comparable level of detail to understand the advantages and disadvantages of both options.

Traffic - The traffic study should analyze and compare the alternative sites for the safety problems and traffic operations at the key intersections on Route 122 and Route 20. The study should include analysis of the proposed access at the Massachusetts Turnpike (Exit 11), and other site accesses.

Wetlands and Drainage - Any relationship between site runoff and the municipal groundwater supply should also be investigated.

Impact on Built Environment - A comparative analysis of the differences between the alternatives in terms of impacts on residential areas should be provided.

Worcester

This section is reserved. When an ENF for the Union Station is filed with MEPA, a review process for the station will be established. If possible, a scope for the review of the environmental impacts associated with that station will be incorporated into this scope.

Boston

The comments from the City of Boston pointed out that this service will increase the intensity of impacts, including increased noise (particularly at layover areas), and higher pedestrian use of limited sidewalk space around South Station and Back Bay Station. The EIR should determine where the increase in impacts will be significant, such that remedial measures are warranted, and propose appropriate mitigation.

Regional Station Issues

The MBTA discussed the possibility of siting a major regional station facility near the I-90/Route 495 interchange. This proposal is envisioned 10 years or more after service is re-established on the line.

The EIR should provide a discussion of the concept of the regional station. It should discuss how large this station is envisioned to be and who is the target service population. The EIR should identify alternative sites for this proposal and discuss, as a conceptual level of detail, the following environmental impacts associated with the siting of a regional station: traffic, air quality, access, wetlands, and drainage.

The EIR should discuss the interrelationship between the local stations and the regional station. Is it likely that any of the local stations would become the *de facto* regional station prior to commencement with of the regional station? How would such a regional station impact local stations in terms of changes in parking and use demand. What levels of ridership and service demand are needed to move forward with the regional station? How does projected ridership correlate to the a regional station concept?

VII. Comments

Additional issues that have been identified in the comments should be discussed or clarified in the EIR.

VIII. Circulation

The EIR should be circulated pursuant to the MEPA Regulations at 301 CMR 11.24. In addition, the EIR should be filed with the local planning boards, boards of selectmen and conservation commissions in each community within the corridor. Several copies shall also be provided to the public library of each of these communities. It should be also be circulated to the public agencies listed below, to the CAC and to the local task forces. Twenty copies should be made available on a first come, first served basis.

October 22, 1992
DATE

Susan F. Tierney, Secretary

SFT/NFB/JMD/nb/jd

Comments received :
Massachusetts Audubon
MA Dept. of Food and Agriculture
City of Boston Environment Department
Boston Transportation Department
MAPC
Metrowest
CMPRC
DEP/Northeast Regional Office
DEP/Central Regional Office
MHC (Sept. 2 and 25, 1992)
MHD
Rep. Kollios
Rep. Gardner

Sudbury Valley Trustees
Boston Area Bicycle Coalition
Worcester Office of Planning and Development
Worcester Planning Board
Worcester Regional Transit Authority
Regional Environmental Council of Central Massachusetts
Preservation Worcester
Worcester Area Chamber of Commerce
Target Worcester
Brotherhood of Locomotive Engineers
Ashland Town Manager and BOS
Stephen Kerlin, Ashland Town Planner
Ashland Planning Board
Framingham Planning Department
Grafton Conservation Commission
Grafton Planning Board
Hopkinton BOS
Millbury Town Planner
Southborough BOS
Westborough Conservation Commission
Westborough Planning Board
Westborough Historical Commission
Westborough Recreation Department
Westborough Town Engineer
Westborough School Committee
Westborough BOS
C. Hitikings
W and H Panas
R. Lister
J. Orlando
M. Marshall
D. McElvery
L. Jankaskas
K. Allen
C. Kelleher
B. and R. Brais
J. and A. Girard
L. Gomes
A. Williams
C. Hoffman
A. Jefts
C. and P. Crivello
J. McCabe
W. Catherwood
M. Lavallee
F. Quinn
M. Sholl

R. Banks
S. Dixon
T. Hopkins
E. Sanborn
A. Batehellu
N. Thompson
R. Tufts
D. McMahon
E. Miss
T. Leendin
E. Colbert
G. Viscardi
D. Goldman
M. Harrington
J. Bianculli

P:SC09154

NOTICE OF PROJECT CHANGE, NOVEMBER 29, 1993

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

John J. Haley, Jr.
General Manager
Tansportation Building
Ten Park Plaza
Boston, Massachusetts 02116

November 29, 1993

The Honorable Trudy Coxe, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street, 20th Floor
Boston, Massachusetts 02202

Attention: MEPA Unit

Re: Worcester Commuter Rail Extension - EOEA #9154
Request for Withdrawal of Draft EIR and
Notice of Project Change for Interim Service

Dear Secretary Coxe:

The Massachusetts Bay Transportation Authority (MBTA) proposal to extend commuter rail service to Worcester now is under review by your Massachusetts Environmental Policy Act (MEPA) Unit. That review is being carried out as a Major and Complicated Project under the control of a Special Procedure. As part of that Special Procedure, we submitted to you a Draft Environmental Impact Report (DEIR) on August 16, 1993. Review originally was scheduled to conclude on October 25, 1993. As I requested of you in a letter dated November 1, 1993, that review now has been extended until November 22, 1993, with your decision due seven days later, on November 29, 1993.

As I indicated in my earlier letter, the review to date has yielded many thoughtful comments and the MBTA has heard those comments and considered them seriously. This has led us to two realizations. First, the Draft EIR now before you needs revision in order properly to reflect our reconsideration and to respond to the comments made by a wide range of reviewers. Second, the delay in the provision of commuter rail service to Worcester occasioned by this revision is not a desirable outcome for public transportation in Massachusetts.

Therefore, we seek by this letter your permission, first, to withdraw our Draft EIR so that we might revise and resubmit it and, second, to proceed with an interim service to Worcester that will

realize at least a portion of the benefits that might accrue from the full service.

The remainder of this letter is devoted to describing that interim service and to discussing its effects on the environment. We hope that you will agree with us that the potential beneficial effects of the proposed interim service outweigh its minor negative effects and will allow us to begin it promptly without additional MEPA review.

BACKGROUND

One of the MBTA's major goals is to complete the expansion of the commuter rail network. Key to this effort is the expansion of commuter rail service to Worcester, thus linking the Commonwealth's two largest cities with the fastest growing mode of public transportation. Initiation of commuter rail service to Worcester on or before December 1996 is mandated by regulation [310 CMR 7.36(2)(c)] to alleviate traffic impacts in Boston which are anticipated during construction of the Central Artery/Third Harbor Tunnel (CA/THT). The MBTA has proposed to better this schedule considerably.

To accomplish this goal will require an extension of the MBTA Framingham Branch to Worcester along the Boston and Albany (B&A) Line, a distance of approximately 23 miles. The right-of-way between Framingham and Worcester is owned by the Consolidated Rail Corporation (ConRail). Currently, ConRail operates freight trains on this portion of the B&A. In addition, Amtrak operates daily intercity passenger service on this line. Therefore, institution of additional service will require the approval of ConRail. Close coordination and open communications among the MBTA, ConRail, and Amtrack will be vital to successful implementation of both interim and future full service.

Planning is underway for full service which could result in a total of five stations between Worcester and Framingham. Environmental review and construction will not be completed in time for the desired Fall 1994 start of service on this line. Therefore, we are proposing an interim service to begin next fall.

Interim service will allow for the beginning of a much needed commuter service between Worcester and Boston while analysis of full service continues. Interim service also will provide important information to be considered when evaluating full service alternatives (i.e., station location, modes of travel, ridership, etc.).

PROPOSED INTERIM SERVICE

To provide for an interim service, the MBTA proposes to operate utilizing existing facilities and infrastructure. Figure 1 provides a regional perspective on the proposed service. The physical and operational elements of that service are described in the following paragraphs.

Track/Signal Systems

Interim service is proposed to be operated on the existing track and signal system between Worcester and Boston. Since additional service on the line will require approval by ConRail, close coordination is in process.

Schedule and Number of Trains

Worcester interim service will provide three morning inbound trains leaving Worcester between 5:50 a.m. and 7:45 a.m. and arriving in Boston between 7:00 a.m. and 8:50 a.m. Evening outbound service will comprise three trains leaving Boston between 4:50 p.m. and 6:00 p.m. and arriving in Worcester between 5:45 p.m. and 7:00 p.m.

Of these six train movements per day, all six will represent new movements between Worcester and Framingham. Only four are new movements between Framingham and Boston, since two of the six will replace trains already on the Framingham commuter schedule.

Interfacing with Existing Train Schedules

The MBTA has developed an operating plan and schedule providing for the additional six train movements per day between Worcester and Framingham and the additional four train movements per day between Framingham and Boston. Existing ConRail freight and Amtrak passenger schedules will not be affected; the existing Framingham to Boston commuter schedule will be improved by the addition of two additional morning and two additional evening trains.

Limits on Train Speed

Interim service, which will use the existing tracks and signals, will have a maximum allowable speed of 60 mph consistent with present Amtrak and MBTA Commuter Rail operations; ConRail freight operates at a maximum speed of 40 mph.

Use of Existing Stations

At Worcester, the existing Amtrak station and passenger platform will be used by MBTA commuters. From Framingham to Boston, commuters will use the eleven (11) existing stations.

Station Improvements

It is expected that minor cosmetic improvements will be made to the Worcester Amtrak station and platform, including general cleaning and painting, inclusion of appropriate MBTA signage and information and repair of minor problems such as cracks in the station platform. Also, a general landscaping cleaning and upgrade will be completed prior to initiation of interim service, as will construction of access stairways and sidewalks connecting the station platform to both existing and proposed parking lots.

Train Layover Facility

The interim service operating plan assumes trains will lay over in an existing, active railroad yard in Worcester. Three sites currently are under consideration. They are owned and/or operated, respectively, by the Providence and Worcester Railroad, Guilford Transportation Industries, and ConRail. Selection of the final site will be subject to operational and contractual agreements between the MBTA and the property owner.

Parking Facilities

Based on 1995 ridership projections by the Central Transportation Planning Staff (CTPS), approximately 300 patrons can be expected to use the interim service from Worcester. Parking for interim service could require up to 250 parking spaces. The required parking will be provided on an MBTA-owned site off Shrewsbury Street, at the Worcester Amtrak Station, and at city-operated lots located under Interstate 290, as illustrated in Figure 2.

Traffic Considerations

Planned development of the immediate area--including renovated Union Station, the Fallon/Saint Vincent Medical City, the Worcester Convention Center and the Gateway Project--has resulted in many recent traffic studies. Using the baseline criteria of year 1993 peak hour traffic volumes for the morning and evening periods, the majority of proposed interim service traffic will occur prior to the morning peak hour and after the evening peak hour and have no significant effect on the Level of Service (LOS) during these peak

hours. The minimal increases in peak hour traffic, from one morning train and one evening train, will not have a significant effect on the existing roadway system.

REGULATORY CRITERIA

The MEPA regulations, at 301 CMR 11.17(3), provide eight criteria by which the significance of a project change is to be judged. We speak in turn to each of these below.

Project Size and Frequency of Activity

Under interim service no new train stations will be constructed and only minor improvements to the existing Amtrak station in Worcester are proposed. Therefore, no significant construction-related impacts are expected.

The introduction of interim service will increase the total number of trains operating between Worcester and Framingham from 19 to 25 per day. The total number of trains operating between Framingham and Boston will increase from 47 to 51 per day.

Further Impacts

Generally speaking, we believe that the effects of interim service are neutral or positive. Specifically, we have examined noise and vibration effects, traffic, at-grade crossings, and parking.

Noise and Vibration

The introduction of interim service may affect the noise and vibration environment along the right-of-way, although the effects will relate only to an increase in the number of trains. Train speeds along the corridor will not increase nor exceed the maximum allowable speeds (60 mph for passenger trains and 40 mph for freight trains). For this reason, the basic noise and vibration characteristics of each new train movement will be similar to those of existing train movements. Due to the small number of additional trains per day scheduled, studies carried out for the DEIR identified no adverse noise effects under interim service conditions.

Vibration levels from the MBTA commuter trains are approximately the same as from Amtrak and ConRail freight cars at their respective maximum speeds. Therefore, potential vibration effects comprise a small increase in the number of vibration events, rather than elevated levels of vibration. In no cases do or will the

projected train vibration levels exceed vibration damage criteria along the project corridor.

Traffic

Under the proposed interim service schedule, only one of the three morning commuter trains will operate during the morning peak hour in Worcester (7:00 a.m. to 8:00 a.m.). The remaining two trains will depart the station well before the peak hour. Similarly, only one of the three evening commuter trains will arrive at the Worcester station during the evening peak hour (5:00 p.m. to 6:00 p.m.) with the remaining two trains arriving well after the peak hour. As a result, only a portion of the total station generated traffic will occur during the morning and evening peak hours (anticipate approximately 100 vehicles in a.m. and 100 in p.m.). These additional trips are not expected to have any significant impact to the existing roadway system, nor alter the current levels of service.

The introduction of interim service may have a slight positive effect on traffic impacts at the Framingham station, since the availability of additional commuter trains will have a tendency to distribute the station generated traffic over a longer period of time. And, service from Worcester may divert some riders who now drive to Framingham.

At-Grade Railroad Crossings

There are four major at-grade railroad crossings between Worcester and Boston. In Ashland the crossings are at Cherry Street and Main Street; in Framingham, the crossings are at Concord Street (Route 126) and Bishop Street.

In Ashland, the crossing gates are currently scheduled to close 19 times each day. None of the closures are during the morning peak hour traffic period. During the evening peak period, the gates close twice for a duration of one minute or less for Amtrak trains. The proposed interim service, with a total of six additional closures, require one closure of less than one minute during the morning peak traffic period and one, one minute closure during the evening peak period.

In Framingham, the crossing gates are currently scheduled to close 47 times each day. Six of the closures, for one minute or less, occur during the morning peak hour traffic period to accommodate MBTA commuter trains. During the evening peak period, the gates close for one minute or less for three MBTA commuter trains and for two Amtrak trains. The proposed interim service,

with a total for four additional closures, will require one closure of one minute or less during the morning peak traffic period and one, one minute closure during the evening peak period.

The effects of these few new gate closures is not expected to be significant, although theoretical delays will increase. For those drivers who currently encounter delays at Ashland and Framingham, the effect should not be unexpected. Any increased delays caused by these additional gate closures will be closely monitored and evaluated. The information gathered during interim service will be used better to predict and understand the at-grade crossing effects of full service conditions.

Parking

As discussed above, it is expected that up to 250 parking spaces may be required at the interim service station in Worcester. Parking requirements for the interim service can be met through use of a combination of the following existing areas:

• MBTA parcel	75 spaces
• City Lot A	79 spaces[1]
• City Lot B	67 spaces[1]
• City Lot C	69 spaces[1]
• Existing Amtrak Lot	30 spaces
• Amtrak parcel	35 spaces[2]
• Condron parcel	30 spaces[2]

[1] approximately 50% of these spaces are currently used.
[2] to be provided when, and if, needed.

The first five provide just over 210 spaces, which should be sufficient for the beginning of interim service. As passenger volumes increase, the last two can be added to provide up to 275 spaces, should they be required.

We plan to monitor, inspect, and survey the interim service station in Worcester in order to gather information relative to ridership, town of origin, mode of access, travel routes, etc. This information can then be used in the preparation of, or for comparison to, projected ridership and parking demands for the full service commuter rail stations.

Pollutant Emissions

Worcester ridership, according to CTPS, will originate from Worcester and several surrounding communities north, west and south of Worcester. License plate surveys indicate that a number of

commuters from the Worcester area and beyond now park at the Framingham and West Natick commuter stations. It is possible, if not likely, that the Worcester interim service could attract some of these commuters. The surveys indicate that Worcester area commuters drive as far as the Riverside Station on the MBTA Green Line.

Reductions in vehicle miles travelled (VMT) and the resultant reduction in the emission of associated pollutants is the ultimate goal of interim service and eventually, full service. The MBTA will monitor ridership during interim service and work to promote new ridership and diversion from private automobiles.

In addition, we have examined the potential air quality effects of the provision of additional parking at Worcester and found that, even should the entire 75 spaces proposed to be added on MBTA land turn over within a single hour, there would be no measurable effect on carbon monoxide concentrations at any nearby sensitive receptor.

Thus, regionally, interim service could reduce VMT, at the margin, for commuters bound to Boston and, hence, reduce emissions of air pollutants. And, locally, no adverse effects on air quality are expected from interim service.

Schedule of Work/Commencement of Service

Although full service of the Worcester Commuter Rail Extension project is scheduled for completion by December 31, 1996, the MBTA has maintained a goal to provide interim service by September, 1994.

The advantages of the interim service plan include early benefits of the project with little or no environmental impacts. Interim service also will provide additional data for the MBTA to address the many issues associated with full service operations.

Project Site

The proposed interim service station will be located at the existing Amtrak Station in Worcester. The site is bounded by Shrewsbury Street to the north, the ConRail Yard to the south and both Grafton Street and the Route I-290 Viaduct to the west (see Figure 2). The station will serve as a temporary facility until the Union Station renovation project is completed.

Work at the interim station will consist of improvements to the existing Amtrak Station platform, opening for public use a 75

space unpaved parking lot within existing MBTA land (including grading, lighting, signing and landscaping), and construction of access stairways and sidewalks connecting the station platform to both existing and proposed parking lots. Due to the minimal amount and nature of new work proposed at this station, little or no construction related impacts are anticipated.

New Permits/Financial Assistance

No State or Federal permits or approvals are required for the interim service portion of the project. Federal financial assistance is not being sought for this project.

Change in Attainment of Improvement in Environmental Quality

The benefits related to the full-build Worcester Commuter Rail Extension project accrue primarily from reduced traffic congestion and improved air quality. The interim service plan is the first step toward the attainment of these benefits and will occur, if allowed, well ahead of the regulatory deadline of December 31, 1996.

Changes in the Ambient Environment

Since three years have not elapsed since the filing of our ENF, this criterion is not applicable.

Finally, while it is not strictly a part of the Secretary's criteria for review of this notice of project change, the proposed interim service has been compared to the review thresholds for new projects in the MEPA regulations. According to 301 CMR 11.27(2), increases in MBTA service do not require the filing of an Environmental Notification Form--only reductions in service are listed as requiring an ENF. Thus, the service itself, were it to be treated separately, does not appear to meet a review threshold. Parking to be added at the Worcester station, totalling 75 spaces, would meet the ENF threshold at 301 CMR 11.27(4)(4)(b), but, as discussed above, has no measurable negative effects. And, the full project ENF covered several times this number of spaces at the permanent station.

PUBLIC REVIEW

Given the great general public interest expressed in this project and the interest expressed by the Citizens Advisory Committee (CAC), we ask that notice of this project change be placed in the next Environmental Monitor and, considering the

holiday period, that comments be accepted upon it for a period of thirty days, with a decision as soon as is possible thereafter. We also are sending this notice to all who received the Draft EIR so each might comment upon it. Finally, we have contacted representatives of the CAC concerning this notice and have asked to meet with the CAC to discuss the proposed interim service and gather their comments. We would be pleased if you or your MEPA staff might join us at that meeting. In addition, we would be happy to meet with you at your convenience, should you or your staff have questions on the notice or on the proposed interim service.

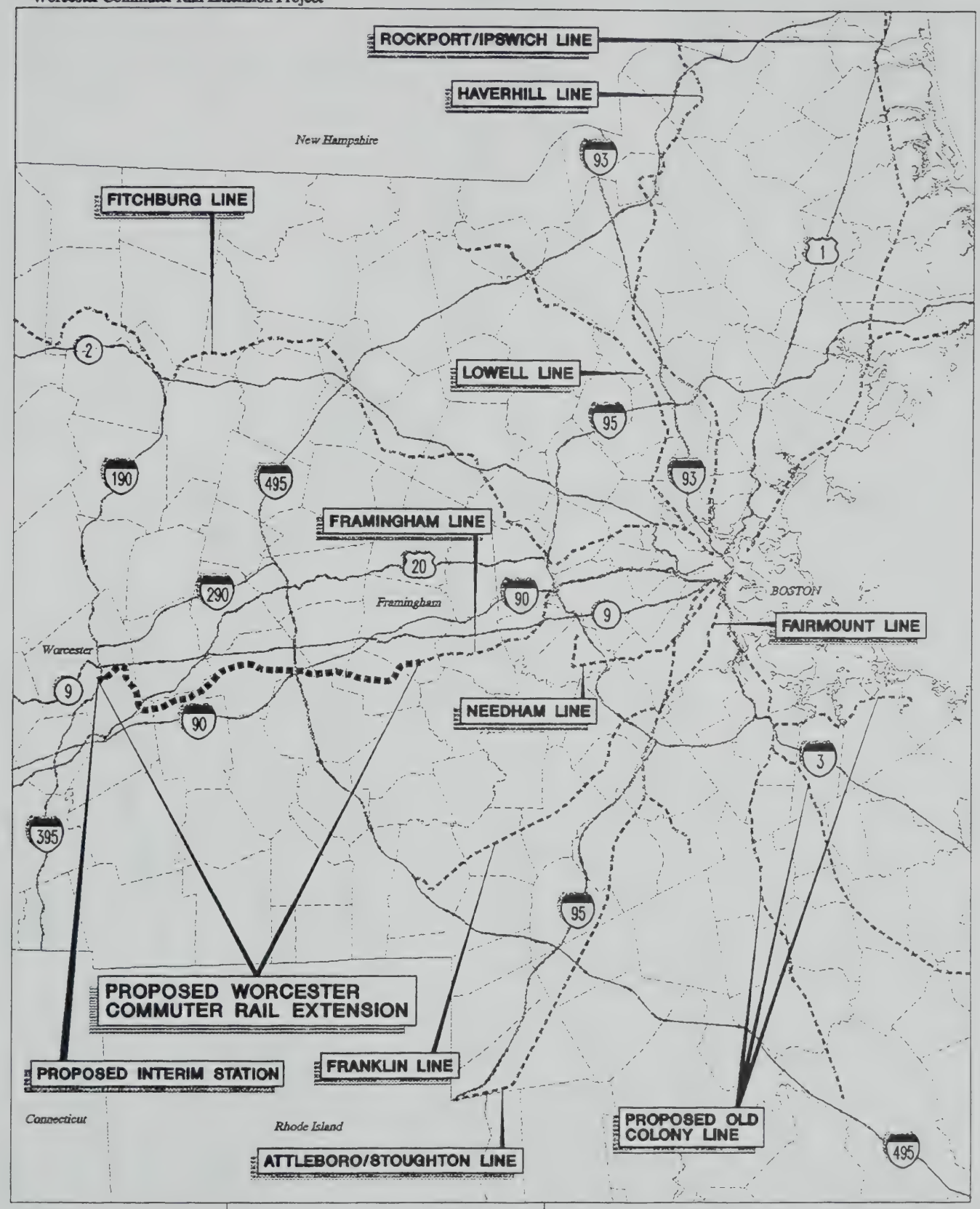
CONCLUSION

The MBTA asks your permission to withdraw the Draft EIR on the Worcester Commuter Rail Extension so that we might revise it in the light of community concerns and resubmit it. So that the opportunity will not be lost to begin a meaningful commuter rail service well in advance of regulatory deadlines, we also ask that you allow us to begin interim service without further MEPA review. We believe we have demonstrated above that the environmental effects of interim service are insignificant and that the potential benefits outweigh any minor negative effects.

We hope that you agree and look forward to your action on these requests.

Sincerely,

John J. Haley, Jr.
General Manager



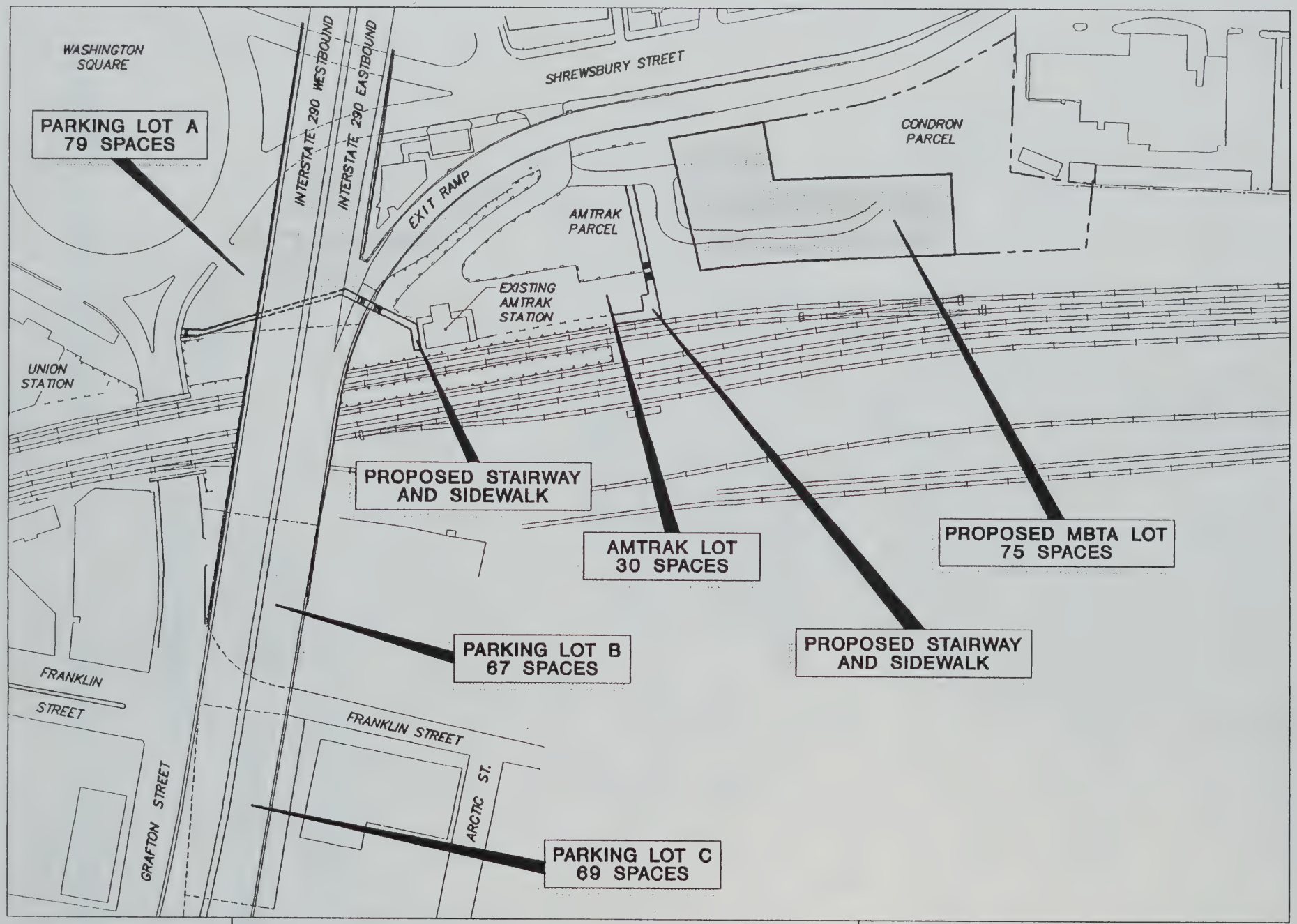
Massachusetts Bay Transportation Authority

Approx. Scale: 1"=8 Miles

0 8

INTERIM SERVICE WITHIN COMMUTER RAIL NETWORK

FIGURE 1



Massachusetts Bay Transportation Authority

Approx. Scale: 1" = 150'±

0 150

SITE PLAN - INTERIM STATION
WORCESTER, MA

FIGURE 2

MEPA CERTIFICATE APPROVING INTERIM SERVICE, JANUARY 14, 1994

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
GOVERNOR
ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR
TRUDY COXE
SECRETARY

Tel: (617) 727-9800
Fax: (617) 727-2754

January 14, 1994

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
NOTICE OF PROJECT CHANGE

PROJECT NAME	:Worcester Commuter Rail Extension
PROJECT LOCATION	:Statewide
EOEA NUMBER	:9154
PROJECT PROPONENT	:MBTA
DATE NOTICED IN MONITOR	:December 8, 1994

The Secretary of Environmental Affairs herein issues a statement that the Notice of Project Change submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G. L., c. 30, s. 61-62H) and with its implementing regulations (301 CMR 11.00).

Introduction

A Special Procedure has been established pursuant to the Major and Complicated provision of the MEPA Regulations to set forth a course for the environmental impact review of the re-establishment of commuter rail service between Framingham and Worcester. The project in its entirely is envisioned to include five intermediate train stations between Framingham and Worcester (Ashland, Southborough, Westborough, Grafton, and Millbury) and a terminus at Worcester's Union Station. This extension will involve approximately 23 miles and the installation of 11 miles of new track.

The Major and Complicated Special Procedure process for this project provides for a comprehensive Draft Environmental Impact Report (DEIR) and the opportunity to move forward with separate Final EIRs for discrete elements of the project. This procedure was established in the event that either accelerating or protracting the review of certain elements could enhance the environmental review, recognizing the varying complexity of certain elements of the project. A Citizens Advisory Committee (CAC) was established to assist the MBTA and the Secretary of

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Environmental Affairs with the review of the environmental information.

A Draft EIR was filed for the overall project and was noticed in the Environmental Monitor of August 8, 1993. Many thoughtful comments were received on the DEIR concerning a wide range of environmental and financial issues. Given the need for significant additional information identified in the comments, the MBTA determined that it was appropriate to withdraw the DEIR in order to address the comments in a substantially revised document.

Concurrent with the request that the DEIR be withdrawn, the MBTA filed a Notice of Project Change that presented an interim service to Worcester. The Notice of Project change described the effects on the environment of the proposed interim service. The proposed service would include peak hour service only, and would consist of three inbound trains in the morning leaving Worcester between 5:50 and 7:45 AM, and three outbound trains in the afternoon leaving Boston between 4:50 and 6:00 PM daily. No new stations will be constructed. Approximately 300 patrons are expected to use this service. The existing Amtrak Station in Worcester will serve as the terminus, pending the completion of the Union Station restoration. Minor cosmetic improvements will be made at the Amtrak Station. The 11 mile stretch needed of new track needed for full service will not be required for the interim service. Sufficient parking exists for the start up of interim service, and parking for 75 additional vehicles can be added at the Amtrak parcel and the Condron parcel, if required. The MBTA is considering three sites for the layover facility. All three are in manufacturing districts in existing rail yards. There are no sensitive receptors in the vicinity of these sites. Final selection of the layover site will be subject to operational and contractual agreements between the MBTA and the property owner.

After careful evaluation of the proposed interim service and its potential impacts, and taking into account the thoughtful comments received on the Notice of Project Change, it is my opinion that the implementation of interim service will have limited environmental impact and can proceed without further review under MEPA. A number of issues have been raised in the comments on the Notice of Project Change, however, that merit discussion. These issues include: the need for a full evaluation of the entire project prior to the implementation of <u>any</u> service, the evaluation of the financial information required by the Scope, and evaluation of impacts related to the interim service.

I will discuss each of these issues below.

I. Need for Full EIR Evaluation

Some of the comments have suggested that no service should commence until the EIR for the overall project is complete. In this specific case, I disagree with that position. The Major and Complicated provision of the MEPA Regulations allows for a great deal of flexibility in the review process of projects and especially allows discrete elements to move forward when this does not preclude full evaluation of the overall project in accordance with MEPA requirements. The procedure set forth for the review of this project specifically recognized that a certain element of the project may be ready to move forward when the environmental issues associated with that element have been sufficiently evaluated. Further, the Special Procedure recognizes that this may occur within different time frames for different project elements, depending on the complexity of the issues related to that element.

It is my view that the Notice of Project Change, taken together with previously submitted data and analysis and the letter submitted by the MBTA on January 11, 1994 in response to the seven questions raised by the CAC, have adequately described the potential environmental consequences of interim service. Further, the MBTA's letter of January 11th includes commitments to work with those communities that have concerns about the effect of operations.

II. Financial Analysis

Many of the comments on both the DEIR and the Notice of Project Change included criticism of the MBTA for the lack of information on the financial analysis. The Scope for the EIR required that a financial assessment of the project be developed within the context of the EIR, provided that there was consensus among the members of the CAC that such an analysis would be germane to its interests and responsibilities, and that the CAC prepare a brief outline of the issues that needed to be addressed.

The CAC determined that this information was germane to its interests and responsibilities, and in June of last year I concurred with the outline submitted by the CAC and forwarded it to the MBTA. Unfortunately, the DEIR contained no financial information, nor did it indicate when such information would be available. This lead to a great deal of criticism and

dissatisfaction with the overall review. I note that no financial information was included in the Notice of Project Change.

I agree that, strictly speaking, this information is not "environmental information." Nevertheless, planning decisions and alternatives analyses are influenced by the costs and benefits of a proposal and financial information can play an important role in the environmental process.

I therefore find it appropriate, and hereby request, that the MBTA provide the CAC with the financial information requested by the MBTA Board of Directors and/or the MBTA Advisory Board with respect to the interim service proposal prior to its implementation. The MEPA Unit should be provided with copies of this information as well.

III. Environmental Effects

The comments of the CAC, Metrowest and the Town of Ashland outline a number of specific issues related to the operation of the interim service. The MBTA has submitted a follow up letter dated January 11, 1994 that responds to these questions and concerns. This letter should be distributed by the MBTA to all of those who commented on the Notice of Project Change, as listed below. I am satisfied that the potential environmental impacts of the interim service are modest and that the potential benefits outweigh any minor negative effects. The MBTA has committed to work directly with the officials of the communities with respect to operational impacts related to interim service.

I also note that the letter of January 11, 1994 contemplates the possibility of "special event trains" for one time events, such as concerts or athletic competitions. The CAC has raised concern that the number of trains would begin to increase, possibly to a significant degree. The MBTA indicates that due to track constraints there are very limited opportunities for this type of activity. The MBTA has committed to notify me should it prepare to increase the number of trains. If and when this occurs, I will make a determination whether further review is warranted.

In closing, I appreciate the efforts of the CAC and all those who have participated in the review of the DEIR and/or the Notice of Project Change. I fully expect the MBTA to honor its commitment to work with the communities, specifically Ashland and Framingham, with respect to resolving any operational impacts. I look forward to reviewing the revised DEIR.

January 14, 1994
DATE

Trudy Coxe

Comments received :
Worcester Commuter Rail CAC
MA Audubon
Town of Ashland
MBTA Advisory Board
Worcester Redevelopment Authority
" " Office of the City Manager
Dept. of Food and Agriculture
Boston Transportation Department
Boston Environment Department
CMTMA
MAPC
Metrowest Growth Management
M.L. White

TC/JD/jd

P:WORCNPC

CITIZENS ADVISORY COMMITTEE (CAC) COMMENTS

CAC - Citizens Advisory Committee
Comments on
Draft Environmental Impact Report (DEIR)
EOEA # 9154

Introduction

The Citizen's Advisory Committee (CAC) has reviewed the Draft Environmental Impact Report (DEIR) submitted by the MBTA for the Worcester Rail Extension Project, and submits the following comments to accompany the DEIR' being submitted to the Executive Office of Environmental Affairs (EOEA) for public review and comment.

The CAC's comments follow the organization of the DEIR, prefaced by a few general policy comments. The headings in boldface type correspond to the headings in the DEIR, and as an aid in matching comments and text.

The CAC plans to comment further during the sixty day public review period.

RECEIVED

NOV 9 1994

EDWARDS AND KELCEY
BOSTON, MASS.

CAC - Citizens Advisory Committee
Comments on
Draft Environmental Impact Report (DEIR)
EOEA # 9154

General Policy Statements of the CAC

GP1	Sec 17.0	CAC wants to be on record, that the now documented interrelationship among station sites requires that a minimum of Ashland, Southborough and Westborough stations open simultaneously (i.e. no more than 90 to 120 days between station openings). FEIR should make a commitment to this schedule *or* provide full disclosure of their station schedule and do full analysis of traffic, noise, etc. impacts for any station brought on line before the others. The host community should retain the right of refusal to bear these impacts albeit temporary. The Certificate permits MBTA to segment each station's FEIR. However, the CAC believes that the DEIR documented interrelationships of Ashland, Southborough and Westborough clearly requires one FEIR covering these three communities. Due to this high degree of interdependence, we urge the Secretary to scope the upcoming FEIR accordingly.
GP2		Assessment issues have been an ongoing dispute between the communities and the MBTA during the ENF stage and then with the CAC throughout the development of two DEIRs. Despite assessments: being scoped; the CAC revisiting the issue and voting it to be germane to our discussions; and our providing a proposed work program for how to answer the assessment question; the MBTA still refuses to do more than cite the existing law. The CAC has decided we are at an impasse. The Secretary can decide whether to push this issue further in the FEIR. However, this action should not be interpreted as acquiescence on this issue. Several communities have clearly stated they need assessment assurances or they will not accept a station. Failure to address the issue now may still result in environmentally feasible station locations being rejected by local leaders due to perceived financial risk.
GP3	Refer to ES-5	The CAC had difficulty in reviewing the MEPA draft because the normal process is to compare all alternatives to find the best, but it appears that this document only had to prove the project "not to be infeasible". The FEIR should address what level of analysis is being used to determine the feasibility of the alternatives contained in this DEIR versus other alternative transportation solutions.

GP4 The Central Transportation Planning Staff's (CTPS) updated projection of ridership demand is now based on 1990 census data. One weakness which the CAC believes exists is under projecting demand from Holliston and the extent to which other MetroWest communities will grow. For instance the Westborough town planner indicates he has not been contacted by MBTA during the past 13 months regarding planned developments. CAC's knowledge of recent, rapid, building activities in this area suggest that ridership may increase more steeply than the projections indicate.

Were the CTPS projections done based upon overall Boston metro population or refined to reflect unique growth scenarios projected for those towns in this region? For instance, the projections below performed by MAPC for CTPS highlight this phenomenon.

	1990 - 2000	2000 - 2010
-- Ashland:	32%	11%
-- Marlborough:	10	3
-- Southborough:	8	2
==> Boston Metro:	1%	-1%

CAC requests that CTPS review projections (this will likely require working with CMRPC) and with specific planning departments to consider building permit trends for the most current 36 months for Holliston, Hopkinton, Southborough, Westborough, Marlborough, Hudson, Ashland and Milford. Please provide CAC with an updated or confirmed projection based upon this review.

GP5 Pg. 15-40 MBTA should divert traffic to collectors as opposed to local streets. For instance: Southborough desires to close the Cordaville Road / River St. intersection to protect the neighborhood and decrease congestion at the North parking lot and General Store entrances. This may increase traffic flow at the River and Southville Roads, but that is where the problem should be handled on a State numbered road as opposed to a side street. Traffic signals should be altered to handle increased flow even if grading and drainage improvements are required. The MBTA is building the station and creating an impact. Sound planning principles dictate that traffic should be directed to a signalized intersection and away from densely settled residential neighborhood.

GP6 Tables 12.15 - 12.18 No performance indicators were presented in the level of service summaries for each station in accordance with EOTC/MEPA guidelines. Presentation of the performance indicators in the FEIR will assist reviewers in determining impacts to traffic operations which do not result in a change in level of service. It is important to understand which end of the "range" for a particular level of service a facility is or will be operating at.

GP7 ES-17 The DEIR measures traffic impact in terms of LOS decreases only. CAC believes *intensity and duration* of impacts are both issues. For instance, in Southborough, the DEIR clearly shows that the peak traffic hour will be extended by station's peak generator hours during both morning and evening. The timeframe nearly doubles in the evening and will be very disruptive in suburban and rural residential areas.

GP8		Install pedestrian gate system at grade preventing commuters from crossing tracks when train is approaching/departing. These may need to be designed so as to prevent people from darting under them in their rush to catch the train. These should be designed as an adequate substitute for the presently planned overpasses.
GP9	3.7	pg. 3-50 CAC requests that the proponent reconcile its mitigation policy to acknowledge that "breaking it" (e.g. an existing service or system) relates to the length of time the proponent is causing diminished service, as well as, the degree to which the proponent is diminishing these services.
GP10		The construction of the new access drives/driveways to the commuter parking lots at the rail stations should not create new intersection traffic problems. Thus the access drives on Rte 122, Megunko Road and River Street need further study in the FEIR. A 1996 LOS D for a new intersection is not acceptable. New construction should be designed to a higher standard, C or better.
GP11		The work planned for this Extension should in no way preclude the electrification of this line. In fact, electrification should be a goal.

Executive Summary Comments

ES-10		The summary asserts that "Without great trouble" the MBTA could put more trains on the Worcester commuter rail line to help meet 1999 Clean Air Act standards. Where will these additional cars and engines come from? How "quickly can they be deployed"? Is their cost included in the $34M price for rolling stock?
ES-11		Since the 800-ft. raised platforms are no longer required, the need for straight track station siting would seem to be greatly diminished. Could this allow for reconsideration of previously rejected sites?
ES-13		The mini-high platforms leave a gap between the platform and the train. Is this gap variable? What is the range of its size? Can a small child's foot get caught in it, or a high heel?
ES-15		The MBTA assessment formula splits all costs of overhead between express and local service. For costs that are not directly attributable to one or the other, the division is based on total express services costs vs. total local costs. In other words, as the express side of the ledger becomes fuller due to expansion, express service becomes more expensive in the assessment formula.

ES-15 The first sentence is confusing. Are the Grafton sites privately or publicly owned? If they are privately owned, are the sites in the other towns publicly owned? This section of the DEIR should be more explicit and clarify this point since many readers may think their stations could ultimately become privately owned. (The CAC understands the land ownership status for each station, however we are already being questioned by people who have obtained advance copies of the DEIR).

ES-15 Although the number of vehicle miles traveled is down, the kinds of emissions being saved is not proportionally reduced. The first and worst part of the trip, cold start to warm-up, will still be taking place in the short drives to the stations. The longer, cleaner part is the part which is reduced. This issue also arose at the time the Program for Mass Transit was being developed. CAC understands that the CTPS can model the "cold start" factor into its air quality standards. Did the model for determining air quality benefit contain a factor which offsets the "cold starts"?

CIRC-5 Jody Young (who was the JRTC alternate) replaced Mary Snyder in the summer of 1993 when Ms. Snyder resigned from the CAC.

Section 1: Project Overview

Sec. 1.5 The statement that "The (Westborough MBTA Advisory) Committee expressed preference for the Smith Valve Parkway site" needs to be clarified. The Westborough MBTA Advisory Committee is charged to advise the Westborough Board of Selectmen, not the MBTA, and did not make the ultimate decision on preferred station location. The Westborough Board of Selectmen did not approve site selection at Smith Valve Parkway and has restated its position in support of a regional station somewhere in the vicinity of Interstate 495 and the Mass Pike. (This also refers to Section 11.5 Candidate Sites -- Westborough *Smith Valve Parkway* -- pg. 11-12 "this site was selected by both the MBTA Advisory Committee and the MBTA").

Sec 1.1 Pg. 1-3 How many would be additional trains?

Sec 1.3 Please correct table 1.3-3 since there are no spaces at the Newtonville stop. We question where MBTA obtained its numbers for parking spaces. Thus unavailability of parking does not deter 428 commuters from driving to this station and parking illegally -- challenging the constrained demand theory.

Sec 1.2 Pg. 1-9 and 3-47 "Authority cannot operate service outside district unless operating losses are reimbursed by some other entity."

What is the Worcester Regional Transit Authority (WRTA) role in this project? Is WRTA contributing funding since Worcester, Millbury, Grafton, Westborough, Southborough (five of the six communities on rail extension) fall into this district? We understand that WRTA is providing funding for Union Station, however, this doesn't affect these other towns.

Sec 1.3	Pg. 1-19	The CAC believes it is inadequate for the DEIR to say "Private bus ridership figures are not available as they are not public information." Real modal transportation figures are essential, since the direct comparison is actually between private, profit-making, bus services and the addition of a multi-million, subsidized commuter rail service. (Please refer the CAC comment on Sec 5.4.)
Sec 1.4	Pg. 1-32	The DEIR does not indicate how many bridges and underpasses east of Framingham have to be rebuilt. If Framingham is as far east as the double stacked cars will be able to go, how does that make the Port of Boston intermodal? Why are we analyzing the cost of double stacking and raising bridges *west* of Framingham if this DEIR states that the line will only be double stack to Boston? Is not the goal to double stack rail lines to Worcester?

Section 2: Needs Analysis

Sec 2.2	Also 5.2	We need more than the data provided to understand why this is the service area, especially since MBTA estimates that patrons for Worcester Extension will be drawn from 6 miles or fewer from the rail line and not from much further than 10 miles away. The model may need to run for a portion of the community (e.g. traffic zone or census tract) as opposed to entire population of communities (see figure 2.2-1). For example, the study area includes the town of Milford as part of the cachement area for the Worcester Extension. Franklin is more accessible given the proximity to I-495. The travel time along Route 85 will be greater than the travel time along I-495. Justification for the Franklin extension to Forge Park, was in part based upon ridership from Milford. CAC requests that the proponent clarify whether ridership is been double-counted for this project -- based upon the MBTA Forge Park project.
Sec 2.6		Same comments as 1-32 above re inconsistency with bridge raising/track lowering is discussed all along route to Worcester. Why does DEIR describe service only as far east as Framingham?

Section 3: Project Elements

3.2: Bicycle Access

Sec 3.2	[1a]Pg. 3-15	The recently enacted State Transportation Bond contains language requiring state transportation projects to consider how to make projects more suitable for bicycle use. Since it is proposed to defray the cost of this project with state funding, much more work will be needed in the FEIR to show how these stations will be multi-modal and in particular "bike friendly."

The CAC requests all roadway improvements create bike path lanes e.g. Southborough Station to Hopkinton State Park. FEIR should detail what the MBTA plans are for improved bike access to their stations. This would decrease traffic count and improve air quality.

Sec 3.2 Pg. 3-12 Who is paying for the reconstruction of the interim station? Is Worcester Regional Transit Authority paying for any of the cost? If so, how much? The CAC is under the impression through the December 1993 Notice of Project Change that MBTA is paying for this. Is this expense part of the $78 M for this project? Where does it factor into the total project cost and also into the cost / benefit analysis?

Sec 3.2 [2] (Figure 3.2-2) Site plans in DEIR fail to address bike usage on site or on train. The CAC requests bike lockers be considered at all stations.

Sec 3.3 Also 3.6 Tables 3.3-1 & 3.6-1 indicate that no bridge raising was analyzed east of Framingham.

The MBTA is proposing to lower tracks along the corridor to provide the capability for double-stack freight service in the corridor. The work is described as "not necessary for the Worcester Extension, but would eliminate future service disturbances if EOTC moves ahead now with its double-stack plans." EOTC's original double-stack plans were for the northern tier tracks used by the Fitchburg Commuter Rail service, and was designed to meet the re-use needs of Fort Devens. Conrail and others objected to this being included in the Transportation Bond Bill. The MBTA should not pay the cost of lowering tracks or raising bridges as part of this project. The DEIR states that this cost will be subsidized by the EOTC, however the financial section does not itemize this cost in a means that is identifiable.

Sec 3.4 [1A] Pg. 3-39 <u>Commuter Rail Train Schedules</u>

"Approximate train schedules..." The proposed Basic Service schedule fails for a number of reasons:

Sec 3.4 [1B] 1. Assuming four sets of equipment based in Worcester, trains 502A, 504A, 506, and 506A must be covered by trains based in Worcester because the first westbound (505) does not reach Worcester until 30 minutes after the departure of the fourth departure from Worcester.

Sec 3.4 [1C] 2. Assuming that 505 turns for 520, the schedule needs adjustment because 510 cannot depart at the same time 505 is arriving. A minimum of 10 minutes must be allowed to detrain and entrain passengers, task the crews to change ends, contact the dispatcher and make the legally mandated brake test before departure of 510.

Sec 3.4 [1D] 3. Following this logic, 509 must turn for 514. The equipment would sit idle in Worcester. Train 513 would turn for 518 and, again, would sit in Worcester for one hour.

Sec 3.4 [1E] 4. Train 520A is scheduled for a 5:20PM departure from Worcester. Unfortunately, there won't be a train set in Worcester until 5:35PM, when 515A arrives.

Sec 3.4 [1F] 5. Assuming the problem with 520A is a schedule glitch and 520A really will have equipment to run with, then the afternoon rush hour trains will start arriving. Train 519 and 521 will put their equipment away in Worcester because there is no schedule for them to return east.

Sec 3.4 [1G] 6. Train 521A will turn for 526. 523 must turn for 530 using the proposed schedule with a layover of one hour fifty minutes. More than likely, 523 will put away in Worcester and the schedules of 527 and 530 will be corrected to allow 527 to turn for 530. Train 531 would be the fourth set put away in Worcester at night.

Sec 3.4 [1H] 7. Train 505 will have to turn for 512 after sitting in Worcester for an hour and ten minutes. In fact 507 will have arrived before 512 leaves and two sets will be sitting in Worcester. 507's equipment will have a two and one-half hour layover waiting for 514's schedule. This is problematic from both equipment and crew scheduling perspectives.

Some may suggest shutting down the train set while it sits in Worcester. This is unlikely to occur because of the required time and tests that must be made after a set is restarted. Further, where does the crew wait during the layover? Moving the equipment to the layover facility would work, but by the time the necessary switching moves were made, it would almost be time to board passengers. These scheduling problems must be addressed in the FEIR.

Sec 3.4 [1J] It should be noted that at all MBTA points outside of Boston operating crews report 45 minutes to one hour before scheduled train departures. This equipment must be up and running by that time to ensure that everything is in working order. Mechanical inspections and tests are completed before time to allow for repairs or to get a replacement set (when practical) started or out of Boston to replace a train that may fail any of the federally mandated tests. (Each train must pass such tests before going into service each day).

Sec 3.4 [1L] Conclusion:

It would appear that adjusting the schedule to make it work is a simple matter. That is not the case. Every adjustment to either an inbound or outbound train affects the opposite direction train because the same set of equipment makes both an inbound and outbound trip. Therefore, multiple schedules have to be changed. This then puts the MBTA in the position of trying to determine whether inbound or outbound service in a given time frame has to be changed.

Sec 3.4 Pg. 3-39 This clearly states that Interim Service will not address Reverse Commuting or Weekend Service; then when DEIR discusses basic and expanded service it is silent on both topics:

a) Reverse commute - the schedules provide for it and the chart clearly indicates that the towns have people who work in Worcester. However, no ridership or air quality credits

are taken for all these outbound stops in the a.m. or inbound stops in the p.m. The FEIR must calculate Feasibility and Ridership for reverse commute. It must also recalculate cost and air quality benefits if in fact there is additional ridership.

b) Weekend Service - Will there be weekend service as originally promised, under Basic Service?

Sec 3.4 Pg. 3-39 to 3-46

It has been emphasized that in order to get people out of the convenience of their cars, public transportation must be competitive with respect to both time and cost. It should also be reliable, clean and comfortable. Interim Service has been running on time in the morning and taking 60-70 minutes to get into Boston.

What will the timing impacts be as each station is added to the schedule? Buses and cars take 60-70 minutes from Worcester now and it gets respectively shorter for each town as you go east. Will the Basic Service still take only 60-70 minutes to get to Boston when the limited Interim Service presently takes 60-70 minutes.

Have there been problems with the Interim Service evening trains? CAC members who investigated were told trains can be up to 24 minutes late in the evening. As verification, the buses that are nearly empty in the morning started to pick up evening ridership as commuters learned the ride home was not time competitive. The FEIR should address all of these scheduling issues.

Sec 3.4 Pg. 3-43 to 3-46

If not included already, please include complete schedules for east of Framingham under the operation of Worcester Extension. The draft provided the CAC did not contain this data, and therefore, it was impossible to determine if new service has an impact on existing service (e.g. changes to station arrival time or deletion of an existing stop or stops).

Sec 3.6

<u>Relationship to Transportation Improvement Program Funding</u>

The report claims that the Worcester Extension. is an element of the state TIP. Since state TIP must be exactly the same as the regional TIP, this statement is inaccurate. The MBTA did not place its non-federal aid projects in the regional TIP. The TIP should not be used as one of the justifications for the project.

Sec 3.6 Pg. 3-16

The cost estimates in the DEIR do not necessarily cover off-site mitigation such as sidewalks, traffic signals, intersection/roadway widenings and resurfacings. The FEIR should address what mitigation will be paid for with the $78 M budget and what will require other funding and from whom. It then should again address availability and timing of funding. <u>All mitigation must be completed prior to the opening of each station respectively.</u>

Sec 3.6 Pg. 3-47

Financial Feasibility

1. The MBTA financial analysis suggests that this service will have a cost recovery ratio of 42% and notes this exceeds the 35% goal set for MBTA services. The report does not suggest where the remaining 58% of the operating budget will come from. Given that the existing MBTA operating budget is funded at $40 million less than in fiscal '94, the level of transit service that is currently operating is greatly restricted by available funds. The CAC is concerned about where the proposed $7 million subsidy will come from without additional funding resources which do not appear forthcoming. While the $7 million operating deficit increase may seem small in terms of the total MBTA budget, since the MBTA's operation is decreasing, its new services will require reductions in other MBTA services in order to be accommodated. In addition, the per passenger subsidy of about $2.50 exceeds per passenger subsidies for even the poorest producing bus routes within the MBTA district.

2. Before retiring from MBTA, Jerry Kennedy provided the CAC with cost recovery figures for this line. Presently the Framingham line has a great 64% cost recovery ratio. This drops to 42% with the extension, because Framingham to Worcester has only a 19% recovery ratio. The FEIR needs to break these numbers out better and explain if we are increasing or decreasing our cost recovery. The proponent also needs to explain what the specific implications are for the MBTA budget.

3. Since the possibility exists that the actual level of service will be closer to "basic" than to "extended", there should be a separate revenue / cost analysis for each service level.

Sec 3.6 Pg. 3-47 The standard that the MBTA Advisory Board and other independent review committees use is the ratio of Fare to the Net Operating Costs. This is consistent with the industry standard (for comparison with other systems) and is the historic standard of the MBTA (to compare its own improvement or lack thereof). It is commonly referred to as the FRR, the fare recovery ratio.

Sec 3.7 Pg. 3-50 The annualized capital cost figures assume a no interest bond or loan. Interest costs would conservatively double the annual capital interest expense budget. The 1990 Feasibility Study showed the OMB method for "annualizing" capital costs and suggested 10% of the total. This would result in an annualized capital cost of $9.7 million -- not the $3.3 million shown in the DEIR. (please also see page 4-12).

Please explain and detail the financing method and cost breakdowns in an amortized schedule (and correct associated tables).

Section 4: Alternatives Analysis

Sec 4.1 Pg. 4-6 CAC requests the proponent to provide a model for bus ridership, with the bus subsidized at the same rate as is proposed for the Worcester Commuter Rail extension.

Sec 4.1 Pg. 4-8 What year were these projections for?

Sec 4.4 Pg. 4-16 How did they reach this conclusion? Clearly the bus will carry more passengers at no cost to the public, and will cause less pollution than the train. In fact, the state makes money by taxing Peter Pan's profit. The CAC believes the DEP will allow a substitute project in the same corridor, and HOV express buses certainly qualify. The FEIR must address alternative selection more cogently and cite specific criteria. This is a prime example of project selection on the basis of "not being infeasible" rather than the project providing an "optimal" solution.

Sec 5

Section 5: Ridership, Regional Traffic & Air Quality

Sec 5.3 Table 5.3-2 and pg. 17-3 CAC is concerned that any town (particularly Ashland) might be looked upon to provide more than its share of the burden for rail services. These concerns have been validated in the most recent DEIR. Although we maintain this concern, we do appreciate the direct and authoritative manner in which the reality is described in the DEIR. Specifically, the DEIR indicates
" ....Ashland would more realistically become ..... the defacto regional station.." This is an unacceptable burden for Ashland.

Ashland has clearly stated to MBTA that failure of a site to be located in Southborough would negate any interest on Ashland's part for accepting a station. Furthermore, an Ashland station must come on-line no sooner than a Southborough station.

Southborough from the outset has been watching the response of Westborough to hosting a commuter rail station, and assessing the impact on Southborough's traffic if no station occurred in either Ashland or Westborough.

Sec 5.3 Also 17.2 Table 5.3-1 CAC acknowledges that individual communities need to carry some of the burden of providing rail service for neighboring communities.

Sec 5.3 Pg. 5-4 This DEIR was submitted to the CAC for pre-review just a week and half before Interim Service started. It would be helpful for the CAC members if the FEIR had a section discussing the first month of Interim Service. We are particularly interested in the accuracy of the ridership projections for Interim Service versus actual counts. At one point in our CAC meetings, upon questioning consultants said any ridership projections can be off by as much as 20%. Small towns which are already predicted to have higher ridership than the second largest city in New England are understandably worried that the projections could be underestimating demand. This report on Interim Service could also provide other data such as impact on ridership when free parking became for-a-fee parking, noise problems, parking problems, cachement area of Worcester Interim Station, and whether schedule worked for both a.m. and p.m. routes.

Sec 5.3 Pg. 5-8 The DEIR does not address the potential impact on existing bus service in enough depth. The CAC has had numerous discussions around the issue. The first draft which was withdrawn clearly indicated that the Worcester ridership will come off the Peter Pan buses as opposed to single occupant automobiles.

Reports to the CAC since Interim Service began appear to bear out that projection. Buses that were running full in early September now have as few as 10 passengers. At a CAC meeting we were told that there would need to be a 13c Agreement between the private carriers and the MBTA because public expenditures would negatively impact their businesses. The CAC had asked that these agreements be addressed in the DEIR. Since they have not been, the FEIR should address their need, and if found to be necessary, how public funds will be committed in these agreements. Should not these financial agreements (if entered into) be added to the cost of the project?

Sec 5.4

Existing Ridership in the Corridor on Public Transit

Sec 5.4 Pg. 5-8 The CAC was able to get ridership data from the Gulbankian bus by simply calling and asking them. Therefore, we do not accept the assertion in the DEIR that they could not obtain reliable private bus ridership counts because it is proprietary information. These figures should be better documented in the FEIR and the comparisons between bus and commuter rail analysis recalculated. Sources for this data include:

- phone surveys of transportation companies
- DPU route documentation filed by the private carriers
- individuals riding the routes and counting numbers of passengers boarding at each stop within the 28 community service area.

Underestimating existing transit ridership will overestimate air quality benefits of the Worcester Extension.

Sec 5.5 Pg. 5-15 Wouldn't the increased speed on the Turnpike credit also apply to an expanded (or even subsidized) bus service?

Sec 5.5 Pg. 5-16 Assuming 5-15 is true, please include the reduction here.

Section 6: Socio-Economic Impacts

6Sec 6.4 As part of the scope of the EIR and the special procedure, financial analysis of the rail extension is considered. Under the present guidelines and revenue / cost projections, Ashland assessment would increase nominally with the inception of rail service. Ashland is the only community on the Worcester extension being assessed. Legislation has been passed, though not enacted, that would exempt Ashland from being the only community on this extension which would be assessed under the present formula. The CAC supports Ashland in it's requests in not becoming the only community which would be adversely affected in its budget with inception of rail services.

Sec 6.4	Pg. 6-7-10	Assessments: Most members of the CAC disagree with the MBTA's statements concerning the likelihood of legislative reform of the MBTA district and its formula for assessments. The Boston Globe reports that a legislative subcommittee of the Joint Regional Transportation Committee has set an April 1995 deadline for developing a more equitable funding system. If the legislative commission revised guidelines in this timeframe, a new formula could be in place by fiscal 1996. For example, the Westborough station, projected to be used by only 22 Westborough riders out of a total ridership of 216 (Table 14.1-4, pg. 14-8), does not offer a great benefit to the town when weighed against potential costs for future MBTA assessments.
Sec 6.4	Pg. 6.8	A cap was placed on the reimbursement in 1983, so the refund to communities is getting steadily smaller. It is difficult to find this because there is no separate item on the "cherry sheet."
Sec 6.4	Pg. 6-9	Should show the Fare Recovery Ratio, as explained above.
Sec 6.5		Please define "equalized valuations for the prospective station site communities".
Sec 6-6	[2]	Same as 6-5 [1]

Section 7: Environmental Impacts - Railroad Right of Way

Sec 7.11		Safety mitigation at West Natick, Wellesley Hills and Wellesley Farms is not addressed anywhere in this document. Even prior to the introduction of interim service, Amtrak, ConRail and several MBTA commuter rail trains passed through these stations at high speeds. All three stations require patrons to cross rail tracks to board or leave the train. Two of the three are also sited on curves, limiting visibility of approaching trains. The addition of 8 to 10 express trains per day will exacerbate this situation. Several improvements are suggested: 1. Better signage: -The current sign "Be Aware of Fast Moving Trains" is not a sufficient warning. - Identifying which trains, by train number, board on the outbound track is almost useless; more relevant information would be time of departure, for example (5:33 PM to Boston). 2. Pedestrian crossovers at both Wellesley stops and West Natick could be incorporated onto nearby road bridges without major construction.
Sec 7.3	Fig. 7.3-1	This chart provides three different thresholds used to determine unacceptable levels of noise impacts. Which agency, if any, has the legal authority to superimpose their standard on the others? What is the purpose of this chart in the DEIR? Are you using EPA standards or are you using Federal Transportation Administration (FTA) standards as stated on p. 7-15? If you are using FTA criteria, why are they not shown in Figure 7.3-1?

Sec 7.3	Fig. 7.3-1	Federal agencies use different terms for what the CAC believes are the same intent. On the chart HUD speaks of "housing environment" while EPA addresses "ideal residential goal." Are these interchangeable terms, or do they mean different things to the two different bureaucracies?
Sec 7.3	Pg. 7-12	The CAC does not agree that noise and vibration impact should only be calculated for residential uses. For example, Southborough still wants Fitzgerald's Store and Ipanema Restaurant assessed for noise and vibration impact both during construction and normal train operations. They are the properties closest to the proposed train stop. Ashland, Westborough and Millbury also have commercial uses very close to their stations. We ask that this be reviewed.
Sec 7.3	Pg. 7-18	Ashland has two senior citizen housing facilities adjacent to railcrossings. Grafton also has rail crossing traffic which will increase by 100% under this service. There are specific concerns with the analysis of noise / vibration and wish to see further clarification of the mitigation for these impacts. CAC requests the MBTA, by it's generation of a nearly 100% increase in Ashland's and Grafton's rail crossings provide, in close coordination with ConRail, relief from locomotive horn blasts by installing a stationary horn (or other suitable technology) for rail crossing warnings.
Sec 7.3	Table 7.3-1	On pg. 7-15 the DEIR states that FTA criteria determine impacts based on existing ambient noise levels. If you have a quiet area with ambient noise of 42 dBA, you can add as much as 10 dBA with no impact, but if it is noisy (i.e. 70 dBA) you can only add 1 dBA before you have an impact. Assuming this is all correct, then the MBTA should explain Table 7.3-1 Train Noise Impact Assessment at station locations. For example, Grafton has an existing dBA of 70. The standard explained above is that you can add 1 dBA to a 70 dBA with no impact. If you have an impact then the MBTA should mitigate. Yet Table 7.3-1 goes on to indicate they predict they will add 2 dBA with no impact. Which information is correct -- the 1 dBA limit stated on page 7-15 or the 3 dBA limit found in Table 7.3-1? It would appear that there are impacts in Grafton to which the MBTA is not admitting.
Sec 7.3	Table 7.3-2	The CAC shares Grafton's concern about the degree of noise impact they might incur. It was unclear how Table 7.3-1 says there are no impacts (albeit this is challenged in the above comment), and Table 7.3-2 then states 6 residences are impacted with Basic Service and this jumps to 26 units with Expanded Service. There is not enough explanation in the DEIR to make this understandable to the average reader. The FEIR should clearly explain and elaborate on these sound impacts in all of the towns. Data should not be buried in the appendix which requires a level of expertise not possessed by the average reader from the impacted communities. FEIR should do this work for the reader in an easily understood manner.

Section 7.3: Noise and Vibration

Sec 7.3 [2] Figure 7.3-2 DEIR plots a graph showing MBTA and Conrail locomotives creating higher noise level than AMTRAK locomotives. The logic appears faulty for two reasons. First, approximately 17 locomotives of the AMTRAK fleet are exactly the same type of engine that AMTRAK uses to haul its trains in the area under discussion; the F40PH engine. These locomotive engines run at a constant maximum RPM to provide electrical power to the coaches, in addition to providing propelling power to the wheels.

Second, MBTA has other types of locomotives known as F40PH-C class engines. These units have a separate donkey engine that supplies power to the coaches. The main engine is used exclusively for propelling power. As a result, the RPM's of the main engine are determined exclusively by the position of the throttle, the same as on Conrail's freight engines.

It is very difficult to believe that variable speed engines (which will not be in the higher throttle positions all the time in passenger service) generates louder sound levels than an engine which runs constantly at the maximum RPM possible. Interestingly, the dual engine locomotives are described on page 9-7 and it is clearly implied that such engines are quieter. Further, see Figure 9.3-1 on page 9-9 for what *appears* to be data in conflict with Figure 7-3.2.

These measurements may overstate the baseline noise dB levels which may result in a smaller increase from this baseline as service increases. Grafton and Westborough measurements will be actually higher, since the semi-enclosed environment (given the density of buildings adjacent to the tracks) produces more reverberation of train sounds.

Sec 7.8 CAC is awaiting comments of FEIR regarding historical issues before offering detailed comments.

Section 9: Environmental Impacts - Layover Facility

Sec 9.3 [1] Noise impacts from Layover Facility Operations

Sec 9.3 [2] CAC requires additional information in the FEIR regarding noise impacts at the Layover Facility. The assumptions outlined in the first full paragraph on page 9-7 created confusion for many CAC members. It would seem impossible to start a locomotive up, run all of the required tests, move the equipment from the layover facility to the originating station, board passengers and depart in 45 minutes -- at least not at the Worcester location because of the make-up of the operation. Trains do not go into service from the layover facility. They move to their originating station and sit there idling while commuters board. The paragraph is misleading. FEIR must clarify this issue.

Further, after all of the required tests are completed on equipment which has been started, the equipment would move from the layover facility east to a point in the general area between CP43 and MP 44 onto the main line.. The crew would change ends, make a brake test, get permission from the dispatcher to reverse direction west on the main line without signal indication, proceed west to Worcester station and reverse the process just described for the scheduled departure east from Worcester. Time is also spent boarding passengers who tend to "dribble in" a few at a time prior to departure time.

Due to the scheduling inaccuracies indicated, the FEIR should consider the likelihood of as many as three or more engine sets idling simultaneously over longer periods. Peak generation of noise is actually greater than the DEIR indicates. We ask that re-projections of noise and emissions be recalculated.

Assuming it takes one half-hour to make the moves from the layover facility to the station, and a 45 minute start-up and inspection period (which we are told is below the Federal Railroad Administration average for an entire train set), the idling time in the immediate vicinity of the facility and the surrounding area is <u>at least</u> an hour and fifteen minutes, probably longer <u>per set.</u>

If two of the sets are the F40PH (not F40PH-C) class, there are then two engines idling at 900 RPMs each, in addition to any noise generated by the other equipment in the area.

The argument has been made that only F40PH-C units will be sent to Worcester to mitigate the noise problem. However, the second day of Interim Service saw the introduction of the F40PH to Worcester. The third day saw the noise complaints on the front page of the Worcester paper, complete with pictures. This must be resolved in the FEIR.

The "peak idling period" is directly tied to the schedule, since the schedule determines when equipment must be started. Please see our comments above on the schedule and need for fine tuning of this schedule. If the schedule(s) included in the DEIR are adopted, noise in the immediate vicinity of the facility will be increased throughout the day by idling equipment waiting to make its scheduled turn back to Boston.

Sec 9.3 [3] The "peak idling period" is directly tied to the schedule, since the schedule determines when equipment must be started. Please see our comments above on the schedule and need for fine tuning of this schedule. If the schedule(s) included in the DEIR are adopted, noise in the immediate vicinity of the facility will be increased throughout the day by idling equipment waiting to make its scheduled turn back to Boston.

CAC requests that noise mitigation take place or the facility will simply become the subject of unending complaints.

Sec 9.3 [4] Pg. 9-10 Under the heading "Noise", second paragraph, one of the "measures to minimize noise impacts..." is "(3) an active community liaison program." The CAC points out that the best liaison in the world simply cannot mitigate the way equipment is engineered.

Section 11: Alternative Commuter Rail Station Sites / Design

Sec 11.0 Pg. 11-11 The DEIR states that "While a regional station is still a long term goal, the MBTA decided to concentrate efforts on extension of service to Worcester and leave the detailed planning for a regional station for another project to be scheduled at a future date."

The CAC disagrees. The site of a regional station should be settled -- prior to the construction of local stations. This CAC, the Westborough Board of Selectmen, Southborough Board of Selectmen, Westborough / Northborough Area Chamber of Commerce and the Westborough Rail Advisory Committee all strongly support the undertaking of a thorough feasibility study of an I-495 regional station as proposed in the Transportation Bond Bill. This study needs to be conducted before a decision is made on the need for local stations or their siting. Construction schedule and costs should be included in this study, as well as, further alternative siting combinations.

Section 12: Environmental Impacts - Millbury

Sec 12 Fig. 12.1-4 It is surprising to see no traffic accessing the station from the Mass Pike. CAC would expect riders from Charlton to arrive on the Mass Pike, as well as riders originating from communities west of Charlton, which may have been underestimated.

Sec 12 Table 12.1-5 and 12.1-8 The majority of the intersections studied for this station are located in Worcester, however, there is no mention of contact with the Worcester Police Department regarding accident history.

Sec 12.1 Pg. 12-14 The Route 146 / Mass Pike Interchange FEIS/FEIR shows a reduction in traffic volumes of approximately 20% on Route 20 west of Route 122 and 25% on Route 122 north of Interchange 11 with the proposed project, however the traffic analysis does not reflect this condition.

Sec 12.1 Pg. 12-14 The 1994 No-Build traffic volumes presented in the Route 146 / Mass Pike Interchange FEIS/FEIR on study roadways are significantly higher than those used for the 1996 traffic analysis. This should be explained.

Section 14: Environmental Impacts - Westborough

Sec 14.1 The CAC acknowledges there are specific questions pertaining to the traffic dispersion model (and how it was applied) at this Westborough site, specifically the traffic projections for Fisher and Maynard Streets. MBTA officials should work closely with Westborough to reconsider the assumptions in the traffic model and to re-run this model if necessary (e.g. conduct traffic counts at Maynard St. / Rt. 135).

Sec 14.11		The CAC has received an update from MBTA stating that Westborough and Southborough will now have sidewalks, however the location of these is uncertain. The FEIR should state where these sidewalks will be located, the number of linear feet and any increases in site development budgets.
Sec 14.2	Pg. 14-26	Based upon recalibration of the traffic model (as described above), if traffic increases are shown to occur on Fisher and Maynard Streets, then air quality tests should be performed for residences and the schools along Fisher Street, due to vehicles using this area as a shortcut to reach Smith Valve station.

Section 15: Environmental Impacts - Southborough

Sec 15.6	[1]	Issues Scoped but not Addressed
	Pg. 15-33 & 34	The scope for the DEIR told the MBTA to address how the Southborough station should fit into the character of the rural village business district, and how the granite bridge would be maintained as a gateway to Southborough. Neither issue is covered at all in this DEIR. Both needs detailed discussion in the FEIR.
Sec 15.1	Pg. 15-11	CAC does not agree with the DEIR projection that 50% of the Upton train riders already use Southborough as their route to the Mass Pike. To save time, Upton uses I-495 to the 11a entrance to Mass Pike. Traffic impacts resulting directly from the station should be adjusted upward in the FEIR.
Sec 15.5	Pg. 15-33	Based on its field trip to all proposed station sites, the CAC supports a recreation and landscaping project for Mill Pond, the Sudbury River and Stone Arch Bridge in Southborough. However, the DEIR gives no more than a couple of sentences to this topic. The FEIR should offer more detail.
Sec 15.10	Pg. 15-38	It has been agreed that sidewalks will be built in the proximity of Southborough Station, as well as on, the station site. This station has a high potential to service Hopkinton State Park. Thus, the sidewalks exiting onto Route 85 at the new access driveway should provide crosswalks to get park users on the right side of Route 85. The crosswalks may also need pedestrian lights to assist safe crossings during peak hours.
Sec 15.12	Pg. 15-22	CAC supports Southborough in strongly disagreeing with the supposition that traffic problems at the Route 85 / Southville Rd intersection can be remedied by merely retiming existing traffic signal. Instead of debating this, CAC requests that the MBTA petition MHD District 3 *now* to retime these lights, and then conduct additional, comparative analysis in the FEIR. Since the Route 85 bridge has been closed, traffic patterns have changed. MBTA should coordinate with Southborough how the address this issue in the recommended signal timing experiment.

Section 16: Environmental Impacts - Ashland

Sec 16.0	Fig. 16.0-1	Off set boarding platforms...

The problem is that the platforms are offset from each other on their respective tracks as much as 700 to 800 feet. We already know that both tracks will be signaled for use in both directions, therefore trains may operate on either track. The majority of the time, the same track will be used. However, there are commuter trains, AMTRAK trains, Conrail's freight trains to be considered and the Westborough rail / Auto Yard at MP30 off track #1. All of these will play a factor in the dispatcher's decision as to which track to route a train to on any given day.

Assume the passengers have all gathered to board on either of the platforms and the train is routed to the other track. Now, passengers must walk the length of either platform to get their train. This is time-consuming process for the able-bodied. It will be longer for the chair-bound especially since they only have 45 feet of platform space available to them and it is at the exact opposite ends from one another.

We strongly recommend that this style of platform alignment not be adopted, or that the offset distance be reduced. In re-routed situations, passenger track crossings could delay trains for 5 to 7 minutes, or more if there are handicapped passenger.

Sec 16	Fig. 16.0-2	DEIR shows 200 parking space capacity in Ashland, on the North side of tracks. Parking spillover is likely. Thus, the town would resort to restricted on-street parking between certain hours and also implement a "tag and tow" policy for controlling any parking lot spillover. The CAC requests a reevaluation of the proposed 200 parking spaces on the north side of the tracks.
Sec 16.1		Ashland understands the challenges associated with development of this alternative and firmly believes that coordinated remediation of this property can be a win - win situation for the EPA and MBTA. This would require close coordination with EPA and Mass DEP.
Sec 16.1		The proposed Ashland West alternative is shown to have floodplain and some wetland. One potential solution is to break up the parcel into smaller "dry" parking lots (similar to West Natick) to avoid any wetland impact.
Sec 16.13	Pg. 16-51	Traffic approach and dispersion for the Ashland West alternative is somewhat problematic, given current road and bridge configuration at Pleasant & High St. How does the proponent plan to address this?

Sec 16.13	Table 16.1-8 & 16.1-14	The proposed access road to either East or West alternative from Route 135 would require signalization / integration with existing Route 135 signals. This must be addressed in the FEIR.
Sec 16.1	Pg. 16-48 & 58	CAC has a policy statement that sidewalks would be required at all rail stations to link them to pedestrians. Under the "west" alternative, DEIR does not indicate that Ashland needs them for access across the Cordaville Rd./ Pleasant St. bridge and as appropriate elsewhere.
Sec 16.17	Pg. 16-56	The DEIR and MBTA acknowledge the existence of floodplain, wetlands and sensitive areas on the proposed western alternative Ashland site. A site redesign may potentially avoid wetland impact. We reguest MBTA consider breaking the proposed south lot into parcels (much like the west Natick MBTA lot).

Section 17: Regional Station Analysis

Sec 17. [0]

Sequencing /Timing Issues

This is an inadequate analysis of the regional station option, because it pre-supposes that all local stations are built prior to the regional station. Their market share is then slightly redistributed when the regional station is built, resulting in a low ridership and a "not cost feasible" determination. MBTA misses entirely the local viewpoint. We want a regional station instead of local stations. Do not build local stations by 1996 -- but rather put regional station on-line, then smaller stations if needed, e.g. Ashland. Southborough and Westborough would use the regional station.

Undoubtedly, the ACEC status of Cedar Swamp presents a problem for siting a regional station but positive, creative solutions may yet be found if really desired. The FEIR should continue to look at regional station option and not drop the topic as proposed in the DEIR. A conservative estimate of ridership totaling 1,290 patrons boarding at I-495 cannot be ignored. This number is conservative because it was obtained by running the 28 community cachement area model as opposed to looking at additional riders coming from the south, north, and west along I-495 and Mass Pike to get to Boston.

Sec 17.2 Pg. 17-3

"No specific ridership estimates were prepared for an alternative in which a regional station and all other intermediate stations except Westborough were constructed." The CAC had requested projection without Westborough and Southborough, at their meeting with the MBTA and its consultants on May 29, 1994. MBTA has told the CAC that it has the capabilities to develop this scenario. These omissions should be included in the FEIR.

Sec 17.0		"A recent MBTA number plate survey in the parking lots of its Framingham terminus and other stations within the I-495 belt confirms that a significant patronage from central Massachusetts exists already. The demand can only increase with a Worcester boarding option." TELEGRAM & GAZETTE, September 15, 1994 -- " "An I-495 Regional Station."
App I	Pg. 1-308-9	Information regarding Fountainhead Plaza project is erroneous and out of date. Permits have been obtained for construction of a WalMart at that location. This project is progressing and it is reasonable to expect that it would be completed by late 1996. The WalMart project needs to be included in both the 2001 and 1996 "No Build" traffic projections.